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THE INDUSTRIAL-ARTS MAGAZINE

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INDUSTRIAL-ARTS MAGAZINE

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Industrial-Arts and Prevocational Education in Our Intermediate and Junior-High Schools

I. MEETING PRESENT DAY NEEDS

A. H. Edgerton, Indiana University

IN keeping with the rapid changes in our social and industrial development, there are growing evidences that an increasing number of schools are seriously attempting to prepare boys and girls to meet the new demands for efficient service as members of families and of vocational and civic groups. Perhaps the most noticeable indication of this step has been the decided change in the *purpose, content,* and *method* of the work now offered both in industrial courses as a means of general education and in classes for specific vocational education. Although industrial arts, manual arts, or the socalled prevocational courses, and strictly vocational classes do aim at entirely different objectives, nevertheless these are closely related in so far as a complete program for a democratic education is concerned. In fact, the success of vocational education partially depends upon the previous understanding, insight, and general acquaintance which the pupils have had with the actual conditions and relationships in the industrial and commercial world. Of unquestionable importance is also the additional fact that the future wage-earner is a consumer as well as a producer; that a program for public education which neglects to help individuals to consume intelligently and utilize the hours of leisure wisely is decidedly undemocratic.

Experience has taught us that the instruction for those who are preparing for direct entrance into industrial pursuits or skilled trades, or are returning for trade extension work, should help them to acquire a high degree of manipulative skill or add to their technical efficiency. Recent reports from intermediate schools and junior-high schools on successfully tried units of industrial work, some of which will be given later in these articles, likewise show a generally accepted belief that adolescent pupils might well gain some knowledge of a reasonably wide range of typical industrial activities by having first-hand information and experience in important processes of manufacture, transportation, and commerce as a foundation for their life work. In the former case, the success of the individual depends largely upon skill and knowledge as these relate to quality and quantity production in some form. In the latter case, *the "self-finding" period demands appreciative insight into a sufficient number and variety of representative experiences to try out, discover, and develop ability for understanding and doing, as well as managing and supervising industrial work.*

Current Tendencies in Seventh, Eighth, and Ninth Year Courses.

The junior-high-school or intermediate-school *plan for selecting and organizing as large a variety of profitable experiences as possible and practicable is favored by over 123 of the 379 schools* which have recently reported from 21 different states on the industrial activities now being offered to their seventh, eighth, and ninth grade pupils. Table I shows that practically no changes are claimed in the purpose, work, and method of the industrial subjects in less than ten per cent of these socalled reorganized departments. However, these same data show that over 67 per cent of the 379 schools in question not only include notable changes in their upper grade curricula but also encourage the deferring of definite vocational choices as long as is possible. The majority of the school organizations which favor specialization in particular differentiated courses, either at the beginning or at the end of the first term in the seventh grade, are located in cities of over 200,000 population, indicating that the chief reason why nearly one-third of these schools now foster courses which are optional in name only, and actually impose early choices on the adolescent pupils, may be due to the administrative difficulty involved in the offering of a greater number and variety of activities to large numbers of pupils. With two exceptions, all of the administrators who have commented on this situation state frankly that they are desirous of overcoming this apparent undemocratic practice just as soon as a satisfactory arrangement can be devised to meet the administrative problem of providing for all of the pupils.

In the 303 most progressive schools reporting on their main objectives, the equipment, the materials, and

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Table I. Pertinent Facts Showing the Relation Between the Size of the Community and the Nature of the Industrial Work Offered.

Population of Cities	Schools Reported		Claiming Reorganization		Denying Reorganization		Nature of Work
	Number	Per cent	Number	Per cent	Number	Per cent	
5,000 to 10,000	76	20	49	13	27	7	Bench woodwork, and bench woodwork and drawing in over 97 per cent of these schools.
10,000 to 25,000	185	49	177	47	8	2	3 to 6 activities such as carpentry, concrete, electrical, printing, machine shop, pattern making, foundry, drafting, etc., in 93 per cent of cases.
25,000 to 200,000 and over	118	31	116	30.5	2	.5	6 to 16 activities and related studies in over 96 per cent of these schools.
Total	379	100	342	90.5	37	9.5	Over 75 per cent diversified to some extent.

the technique in nearly all cases chosen from important industrial pursuits, but with few exceptions, the recognized pupose of the work and study in these courses as shown in Table II. is not primarily to produce skilled workers for definite vocations, as is true in the trade preparatory or trade continuation classes. The main objective is rather to help all pupils, regardless of their social status or possible lifework, to develop industrial intelligence and thinking power in connection with life situations. Therefore, each activity not only includes contact with typical materials, tools and machines, but is also organized with the intention of (1) giving a broader appreciation of economic production and demanding more respect for the various workers and their work; (2) of preparing for more intelligent judgment and use of industrial products and service; (3) helping develop insight and to promote more efficient production; (4) of offering opportunity for testing the interests and aptitudes of students both in positive and negative ways, in order that worthy needs and capacities may be developed through specific training. As shown by Table I, the size of the community too often determines the extent, nature, and effectiveness of the activities offered.

Table II. Main Reason Given for Offering Industrial Activities and Related Studies in Each of 303 Intermediate and Junior-High Schools.

Chief Emphasis and Claims	Schools Number	Schools Per cent
Contributing to the general experience, all-around development, and industrial intelligence	118	39
1. Understanding and appreciating economic production in some form;		
2. Gaining respectful attitudes toward the various workers and their work;		
3. Having ability to judge industrial products and do simple repair and construction work, etc.		
Aiding in the intelligent selection of industrial occupations without encouraging early choices	101	33
1. Trying-out individual inclinations, interests, and capacities for industrial pursuits through typical experiences;		
2. Making reliable studies of the conditions, demands, and opportunities in related occupations; etc.		
Enriching the school experience of the pupils through concrete situations	78	26
1. Having science, mathematics, and other subjects, profit from a better understanding of materials, processes, tools and machines;		
2. Providing for the individual needs of pupils who would not remain for academic education alone.		
3. Helping pupils more wisely to choose future courses in secondary and higher education, etc.		
Preparing for entrance into industrial vocations	6	2
1. Extending the try-out activity to meet the preparatory-vocational needs of pupils who find it necessary to leave school with a minimum of preparation;		
2. Offering greater opportunities for commercial experiences in shopwork by cooperating with outside productive plants during the ninth year, etc.		

That the actual shopwork in a considerable number of these large and smaller secondary schools includes a fairly wide range of experiences is shown in Figure I.

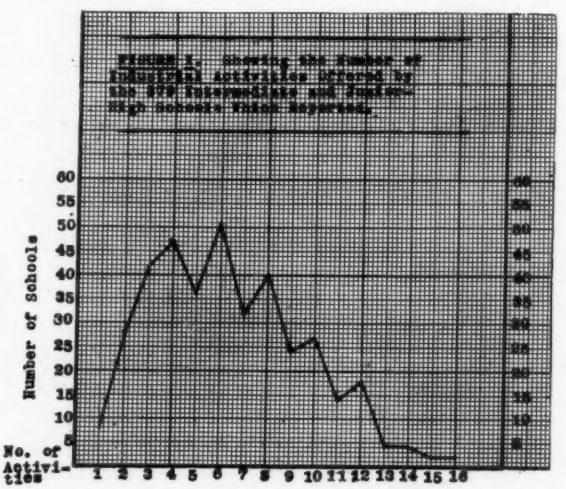


FIG. 1. INDUSTRIAL ACTIVITIES OFFERED IN 379 JUNIOR HIGH SCHOOLS.

These are selected in the main from present-day occupational pursuits, such as printing and publishing, carpentry, cabinet and furniture making, wood finishing, pattern making, foundry, forging, machine shop, sheet metal, concrete, photography, electrical, plumbing and pipefitting, automobile operation and repair, general construction and repair, drafting, and the like. Because of the advantage in having several kinds of materials, tools and machines available in one unit for immediate use, and also because of the extended opportunity for observing many distinct types of construction

work, a general workshop plan frequently has been developed in preference to a number of separate, specialized shops, especially in the smaller communities. In either case, all projects and problems taken up in connection with each one of these activities preferably result in serviceable and useful products. As the occasion requires it, each project gives some consideration to the kinds and qualities of materials, the appropriate design and construction, the processes of manufacture, the applied mechanics, physical sciences, and mathematics, and the industrial history and civics as these relate to the study at hand.

Dr. F. G. Bonser of Teachers College, Columbia University, has referred to these promising courses happily as those "following the elementary school period, well adapted to the interests of boys during the period of early adolescence when more intensive studies of industry will give a still greater opportunity for testing aptitudes, and develop greater intelligence and appreciation of industrial processes, problems, and relationships. The time for the beginning of this somewhat differentiated work for boys is probably at about the beginning of the seventh grade. The rapid development of the junior-high school or intermediate school bids fair to see such courses well organized for seventh, eighth, and ninth grades with from one-third to one-half of the time devoted to the study of industrial processes, shopwork, and closely related subjects for those who elect such courses, the remaining time applying to the usual general or academic subjects for these grades. By providing partial differentiation in these years, and at the same time keeping much work in common, the individual interests and aptitudes of children may be respected and developed, and yet the democratic character of the whole school maintained."[1]

Types of These Junior-High-School Industrial-Arts Activities.

The following types of eighth grade industrial-arts courses, which first were inaugurated three years ago as a part of the junior-high-school program at The Lincoln School, New York City, [2, 3] and incorporated the most successful and practicable features resulting from a careful study of over 300 progressive junior-high schools and intermediate schools in various parts of the country, are examples of the promising organized activities already described in some detail for either the large or small school system. A minimum requirement of three hours weekly during each of the seventh, eighth, and ninth years is found to be a reasonable amount of time for each of the essentially required industrial arts units offered.

[1]Bonser, F. G. "New Types of Industrial Work in Schools," Teachers College Record, May 1, 1915, Vol. XVI.

[2]These statements do not account for any changes which have taken place since October, 1920.

[3]*Note*—It might well be stated that the accepted policy of the whole junior-high school was then that "essentially required courses be given for the purpose of giving valuable contact with different types of world knowledge and with interesting and profitable activities; and that such courses serve as a basis for purposeful election of courses in the senior-high school; but that individual students be permitted to discontinue sequences of courses and substitute others, with the permission of their advisers."

Printing and Publishing.

(*Eighth Year.*)

Some freedom has been allowed all pupils in choosing projects to be printed. However each pupil is required to gain certain understanding and experience in composition, stone work, proof-reading and correcting, making-up forms, press work, distribution, and the other important processes typical of the job print shop. The thought-provoking problems, which are usually of a semi-commercial nature, are an outgrowth of the school or individual needs. These include such work as the printing of cards, programs, tickets, and straight matter at first; while later the artistic arrangement of headings, spaces, and lines is applied to the printing of announcements, forms, booklets, school publications, and the like.

This is followed by problems in color work and studies in modern illustrating. As the work progresses, the following types of information and skill are required sufficiently to give all pupils some appreciation of the methods and important conditions in our printing trades.

I. **Composition and Proof-reading:**
   1. Type case.
   2. Handling and setting type.
   3. Tools and materials.
   4. Setting and distributing straight matter.
   5. Printing terms.
   6. Setting and distributing display matter.
   7. Reading and marking proofs.
   8. Correcting type matter.
   9. Setting from manuscript.
   10. Expressing ideas in print in such a way as to attract attention to stimulate thought, and, if possible, to produce action.

II. **Stone work:**
   1. Locking-up in the chase.

III. **Press work:**
   1. Making ready on the job press.
   2. Preparing paper and inks.
   3. Feeding the press.
   4. Study of presses.

IV. **Typography:**
   1. Types and type-faces.
   2. Proportions, harmony, tone, and contrast.
   3. Planning and layout of work.

V. **Studies related to printing and publishing:**
   1. History of printing as it relates to present-day practice.
   2. Making books and magazines (Harper Brothers).
   3. Making newspapers (New York Times).
   4. Relation of the school shop to the larger productive offices.
   5. Conditions, requirements, and possibilities in printing and allied trades.

Machine Shop.

(*Eighth Year.*)

The possible machine-shop problems have consisted of machining, casting and steel parts to be used in the construction of power machines and also the doing of smaller problems such as arbors, washers, bolts, nuts, gear blanks, screws, bearings, bushings, pulleys, lathe centers, tool shanks, box caps, clamps, pipe threading and fitting, and various repair jobs as these are selected from the needs at the school and about the home. This

wide range of work makes it possible for each pupil to have a reasonable amount of freedom in choosing projects and problems in the different divisions of the activity. Before the engine lathe or any other machine tool can be operated by the pupil without assistance, the importance of oiling the bearings, adjusting the machine parts for safety, fastening the work, choosing and setting the correct cutting tools, selecting the proper feeds and speeds, and taking the trial and finishing cuts must be thoroughly appreciated. During the eighth year the following types of information and skill are acquired as a basis for understanding the processes and gaining insight into the metal trades:

I. **Lathe work:**
   1. Cylindrical turning on centers.
      a. Location and drilling of centers, grinding and setting of tool.
      b. Turning to definite size, using calipers, scale, and finer measuring instruments.
      c. Typical lathe operations.
   2. Taper turning.
      a. Calculating tapers.
      b. Method of turning.
      c. Finishing.
   3. Thread cutting.
      a. Calculating change of gears, etc.
      b. Grinding and setting treading tools.
      c. Cutting right and left hand threads.
   4. Chucking and boring.

II. **Drill press:**
   1. Methods of holding work.
   2. Various uses.

III. **Bench and floor work:**
   1. Chipping, sawing and filing.
   2. Laying out, fitting and assembling.
   3. Soldering.
   4. Use of taps and dies.
   5. Tempering and grinding tools.
   6. Key seating and fitting.
   7. Babbeting and scraping boxes, etc.

IV. **Related information:**
   1. Studies in elementary mechanics, mathematics, and short cuts as applied to practical shop problems.
   2. Use, design, and construction of common and special hand and machine tools.
   3. Methods of manufacture and commercial uses of iron and steel.
   4. Relation of school experiences to organization and production in different machine shops.
   5. Conditions, requirements, and possibilities in metal and allied trades.

Related Information as a Basis for Industrial Insight and Guidance.

It is now quite generally realized that *the most urgent need for the majority of boys from 12 to 15 years of age is not so much for a high degree of manipulative skill in trade operations as it is for reliable information with which to judge the industries.* Where the best results have been obtained, the exploratory shopwork plan has been paralleled by a study of real, productive industry rather than by a mere textbook acquaintance. There are but relatively few kinds of raw materials, and comparatively few principles involved in their manufacture. The number of great type industries and their important processes of production also are small to a surprising degree, which suggests that these studies should follow type activities and widely significant operations somewhat intensively. In addition to studies of general industrial conditions and relationships, group excursions to local plants and investigations of the various types of occupations as to importance, health conditions, needs, qualifications, wages, opportunities, conditions of employment, and the like are helping to form sound judgments relative to the character and possibilities of industrial callings. As the occasion requires it, pupils are brought in touch with reliable reading matter, unbiased specialists, or whatever sources of information are most needed at the time. In some schools a simple but effective "vocational index" is used advantageously to record the inferences of teachers and others based upon activities carried on inside and outside of school, both during the attendance and follow-up periods.

While these diversified activities and occupational studies undoubtedly are beginning the preparation of life work for a large number, it certainly should not be assumed that all pupils who are taking industrial arts will go into the industries. If properly organized, a scheme of industrial-arts education should be liberal enough to help those who can continue their school work to choose wisely their more specific courses in secondary and higher education, and likewise help those who find it necessary to leave school with a minimum amount of education to choose their respective occupations most intelligently. Therefore, it is proving desirable to have the work and study include a large number of industries and industrial processes, in order that all may have a rich and varied experience upon which to draw, in any event.

Whenever vocational classes or cooperative courses exist, it often has proven more satisfactory to carry on as little as possible of the additional productive or highly specialized work in the "try-out" or "opportunity" shops of the intermediate school or the junior high school. At any rate, it is reported that a reasonable number of industrial plants are being visited, first-hand information of the proper type is being made available, and an attempt to make the existing relationship between the school activity and the industry represented clear is undertaken seriously in a comparatively large number of these schools.

Possibilities in Courses for Educational and Vocational Guidance.

Much of the criticism of the vocational guidance movement in this country may be attributed to the objection to having early decisions forced upon young persons by the larger experience of teachers and counsellors. When reduced to its lowest terms, this conception of guidance merely concerns itself with placement, which consists of finding jobs or employment for pupils. Although teachers are certain to realize the need for giving counsel and information during the junior high school period, and the very nature of their positions will cause them consciously or unconsciously to give much of both, nevertheless, the experienced teachers

fully realize their limitations in this uncertain field where many pitfalls are possible as a result of misdirection. On the other hand, *the great need for dealing intelligently with the problem of an efficient choice, both as to self-expression and public service, suggests that the decision might well come as a result of the pupil's understanding of economic facts and values.* Even though the school fails to keep its pupils from choosing blindly by presenting the related information and helping them to interpret this in terms of the existing conditions, the fact remains that sooner or later most secondary school pupils will choose their life work.

Several suggestive experiments have been developed to ascertain the benefits which may be derived from organizing separate courses in vocational and educational guidance as a definite part of the junior high school program. One of these courses, which offers some promise, was introduced at The Lincoln School of Teachers College, New York, as an experiment in September, 1919. At that time, it was decided to devote one period of each week to provide all ninth grade pupils with reliable information concerning the social, economic, and larger personal aspects of the most important life occupations. This course was planned to help all pupils who continue their school work to choose their courses more wisely in the senior high school, as well as in their higher education, and also to help those who might find it necessary to leave school with a minimum amount of education to choose their respective procedure more thoughtfully.

In connection with each possible life occupation studied, detailed considerations relative to the nature of the work, the advantages and disadvantages, the qualifications and training, the possibilities, remuneration, and advancement were had through reliable reading matter, class discussions, student reports, talks by specialists, and excursions. This organized information merely supplemented that which had been given in the other school activities by presenting all of the related facts that may help pupils to weigh values and choose their future courses and work. Aside from these vocational guidance values, this course also includes a brief interpretation of economic life, industrial ownership, labor problems, related organizations, scientific management, supply and demand, and the development of our present-day producing and service groups, in order to give understanding and to encourage a wholesome attitude toward work and workers in each occupation studied. Such important life callings as agriculture, fishing, mining, food manufacturing, textiles and clothing trades, mechanical pursuits, printing and publishing, professions and allied occupations, engineering professions, and commercial occupations were studied during the year with apparent interest and profit.

Problems in the Organization and offering of Industrial Activities.

The junior high schools in the large school systems usually have organized their industrial courses on the rotation plan by having separate, specialized shops to provide proper facilities and instruction for the various classes, each pupil of which elects from two to four different activities a year. In the latter case, each one of these unit courses is offered from five to seven and one-half hours a week during a period of either nine or ten weeks. On the other hand, the time allowed for the industrial-arts in many of our upper grade curricula is still entirely too small for the manual aspects of the work and the studies of conditions and processes in the workaday world. Many of the small junior high schools and intermediate schools also are hampered temporarily because of the necessary expense for suitable equipment and instruction. Nevertheless, many teachers in the smaller communities have had the courage to reorganize their courses on the general workshop plan already mentioned, thus adopting the all-around shop which is expanded easily from time to time.[4] This procedure makes it possible to include other typical industrial activities besides woodwork, which unquestionably offers somewhat limited possibilities for getting concrete experiences and studying present-day industries. In some of these schools, where only six different units of industrial-arts are provided, the length of time devoted to each unit course is extended to a semester, if the activity and related study in question can be justified for this time, and the length of the periods or the number of periods a week is reduced to meet the local situation.

In making this investigation it was found that the general aim of the industrial courses for seventh, eighth, and ninth year boys do not differ greatly as a result of the size and location of the school. On the other hand, the organization of each respective department has been determined necessarily by the size of both the community and the school, as a number of instructors and several distinct shops are used to accommodate large numbers of pupils while only one man or perhaps two men will be available to teach industrial-arts in the smaller school. The general try-out courses taught at the Washington and Jefferson junior high schools at Rochester, New York, are examples of the former type, having a separate shop and instructor for nearly every particular form of industrial activity offered. This type of organization allows the boys to have samplings of about ten weeks from each of four different shops during each year. Printing, cabinet-making, gas engine, sheet metal, pattern making, and machine work are each offered for ten weeks, however, this does not mean the same total number of hours in each shop. Printing and cabinet-making are offered during the last half of the seventh year, when only six hours a week are allowed for shopwork, while twelve hours a week are given in the eighth year to gas engine, sheet metal, pattern making, and machine work respectively. During the ninth year twelve hours a week are provided for shop work and, since this is the last year of the try-out

[4] Bowman, C. A. "Industrial Education for the Smaller Community," Manual Training Magazine, Jan., 1917, Vol. XVIII.

period, each boy is allowed to choose one or more activities from cabinet-making, finishing, printing, machine shop, pattern making, sheet metal, gas engine, painting and decorating, plumbing, electricity, and baking. Related industrial mathematics, elementary science, and drawing and design are required throughout the two and one-half years of the course; seven and one-half hours a week being allowed for mathematics and drawing, while one-fourth as much time is spent on elementary science as on shopwork.

It is important to note that the various kinds of industrial activities offered in the Rochester junior high schools are typical of important industries represented in Rochester, New York. In addition to this try-out course plan, each school also offers separate industrial, technical and vocational courses. Perhaps it should be mentioned that the Rochester Trade School, which is likewise a part of the city school system, is prepared to give even more definite vocational education to those desirous of preparing for specific industrial pursuits or trades. This school has trade agreements with many of the leading shops and factories in that city.

Modifications of this plan for the rotation of shop work are being practiced more or less effectively in Duluth, Minnesota, in New York City, in Grand Rapids, Michigan, and in many other cities. The shop work at the Ben Blewett junior high school in St. Louis, Missouri, is organized into two divisions: First, the seventh grade, which has compulsory activities; and, second, the eighth and ninth grades, which have elective shop courses. In other words, each pupil has an opportunity to choose between the technical arts, science, commercial art, and classical courses after completing the essentially required industrial-arts work during his seventh year. More detailed statements of these courses, as well as reports on several units, projects, and problems which have been successfully developed by individuals having somewhat varied points of view and results, will appear later in separate articles.

Improved Methods Needed in Many Industrial-Arts Activities.[5]

In spite of the excellent results and promising outlook which have been reviewed, this investigation makes it evident that tradition practice still too largely determines the content and method of the industrial subjects in the seventh, eighth, and ninth grades. The following facts, which are based on this survey relating to the instruction received by 7,389 pupils in different sections of the country, show that large numbers of these courses include features which are extremely wasteful and consequently omit much that is useful. While a few of these school systems have introduced the junior high school plan of organization in name only, as previously suggested, it is reasonable to believe that the methods and procedure for the industrial courses in these 379 selected schools are, at least, equal to the instruction ordinarily received in other schools having similar aims and purposes.

[5]Edgerton, A. H. "Experimental Work in Junior-High School Industrial-Arts." Industrial-Arts Magazine, July, 1919, Vol. VIII. (See also for Tentative Course of Study.)

I. *Over 20 per cent of these schools report that the shopwork in their courses is confined to work in wood only.* (See Table I.)

Even though this work properly represents the divisions of the woodworking industry (carpentry, pattern making, and the like), and is supplemented by studies of occupations through shop excursions and readings, it at best offers limited opportunity for gaining typical experiences and studying our present industrial pursuits and needs. It is doubtful if those courses which mainly tend to emphasize manipulative skill in the use of woodworking tools can be expected to do more than to gain meager responses in interests, inclinations, and capacities, for reasons which will follow.

II. *Over 78 per cent of these schools report that their courses emphasize the doing of many operations or processes without respect for the needs and interests of their pupils.*

Several of these courses allow the pupils to make worth while products, thus allowing the manipulative skill to be incidental to the solution of the construction problems, but completely fail to allow an opportunity for thinking out and making plans to meet the difficulties involved in their work. The majority of these pupils are required to do their work in a certain prescribed way, as the chief emphasis is placed upon the following of directions, and very little allowance is made for initiative. A number of the instructors of these classes report that they are encouraged to do much of the pupils' work for them, since the success of their courses is frequently judged in terms of the quantity and quality of work which is displayed at the annual school exhibition. The least successful of these courses, however, are those which require all pupils to make formal exercises, models, or pieces that give considerable skill in the use of tools but offer little else of value. Nearly 60 per cent of the instructors admit that the repair and construction work which they are required to do for the school systems forces them to emphasize the production work needed rather than the specific needs and interests of the learners.

Perhaps there is greater danger of exploiting pupils in industrial courses than in any of the other school subjects. This is explained by the insistence of some administrators and teachers upon having all maintenance work, such as repairing and making furniture and other school equipment, printing school forms, and the like, done during the regular shop periods, regardless of whether or not the pupils concerned are benefitted by the particular kind and amount of experience involved in the work which they are required to do. Where the doing of the work is given this undue amount of emphasis, one cannot help wondering if those responsible for this procedure are not more concerned with the repair and construction work than with the educational growth of their pupils. At any rate, some such method as the following must be developed for overcoming this ex-

tremely bad feature of tending to make the school shops a sort of "dumping ground" by selecting experiences which obviously have meager educational value during regular school hours.

An *employment bureau plan,* which was introduced three years ago at The Lincoln School, New York City, affords several unique educational advantages by assisting the older pupils in finding interesting and instructive employment about the school during out-of-class hours. Pupils from all classes of homes are given an opportunity to do certain parts of the school's work, such as printing school forms and announcements checking and receiving pay in the lunchroom, assisting in the library or classroom, and repairing and constructing school equipment. This work in question, is arranged and recorded by the pupil in duplicate form on the job card shown in Figure II, after which it is carried out under the supervision of the teacher in charge of the respective activity. The amount of money which pupils are paid for the different kinds of unskilled, semi-skilled, and more highly skilled or responsible work ranges from ten cents to tewenty-two cents an hour; however, the rate allowed in each case is determined by the nature of the work at hand and the ability of the pupil chosen to do it. Although the pupils are free to give only a few hours a week to this special activity, all of the junior high school pupils participate in at least one or more of these profitable experiences during the year.

In addition to the financial consideration, this employment bureau plan gives pupils a better appreciation of actual service, and offers valuable experience in learning to earn without danger of exploitation. The various tasks not only furnish an excellent substitute for the responsible duties which children have in the rural communities, but also make it possible for boys and girls to use their special interests and abilities beyond the stages when the work can be justified as a legitimate part of the regular class activities. This type of employment organization represents a relatively small investment and is not considered a financial burden in any sense. It provides a satisfactory means for disposing of certain necessary jobs which offer somewhat limited educational value during regular school hours, and it likewise allows the industrial-arts courses to emphasize the needs of the learner in preference to the needed repair and production work which should have a place.

Regardless of the size of the school system, of the industrial-arts activities are to continue to occupy an important place in the program for general education, these courses must be expected to share the responsibility with the other subjects for helping adolescent boys to develop perspective and thinking power in connection with real life situations. Recent investigations clearly show that such larger values as industrial intelligence and insight can not be realized alone from the mere doing and making of things, where skill in the manipulation of materials, tools and machines is the main emphasis. Furthermore, *the psychological and sociological needs and interests of boys from 12 to 15 years of age are mainly in thought-provoking situations, projects, or problems, involving semi-productive or real production work,* rather than in series of exercises, models, pieces, or whatever else you may care to call them. Because of the natural interest which boys of this age have in industrial or mechanical things, they can be required to make series of formal pieces, models, or exercises without much resistance; however, to thus take a considerable amount of time in *over-emphasizing skill in the use of a few tools and materials* means a great sacrifice in the larger values of the work, as already stated. The results of much observation and several experiments make it obvious that any values which exist in such formal courses may be retained and given greater emphasis where the boys' chief concern is the construction and solution of useful projects. The most valuable of these challenge boys to think out, study, and make definite plans to meet the difficulties involved in the related problems, as well as to select proper materials, tools, and operations; to make calculations on stock, operations and cost when needed; and to carry out the other requirements which the specifications demand.

The preceding article is the first of a series of four papers on the Industrial Arts in Junior High Schools. The second will take up "Methods of Offering Industrial-Arts Courses and Projects."—Ed.

The First Glassware Made in America

Temple Collection Includes Products of Pennsylvania and New Jersey Factories More Than One Hundred and Sixty Years Old

By W. Calver Moore

A COLLECTION of antique glassware whose beauty of finish, variety and perfection of design, and skillful craftmanship would delight the heart of the antiquary has been on display at an art gallery in Philadelphia recently.

These relics of one of the first industries of this country are included in the Temple Collection of Early American Glass, comprising more than two thousand separate pieces with a total value that runs well up into six figures.

Peculiar historical interest attaches to this collection inasmuch as the first commercial enterprise started in America was a glass factory established at Jamestown, Virginia, between 1621 and 1625, where four Italian workmen engaged in the manufacture of glassware, their principal product being glass beads for trade with the Indians. Some specimens of these beads from the Jamestown factory were found in Indian graves along the Susquehanna River in Lancaster County, Pennsylvania, and are included in the Temple Collection.

The major portion of the exhibit, however, is devoted to table glass ware, although there are also a number of flasks, flagons, and odd shaped whiskey bottles, some of them molded in the design of a log cabin with the neck of the bottle forming the chimney. These are priceless.

Practically every form in which glass could be blown for table use is represented. There are blue sugar bowls, high salt cellars, carafes, sillibubs, double cruets, "cotton thread" wine glasses, cream pitchers, flips, decanters, an amber mug so rare that only one other specimen is known to exist, vases, plates, candy jars, water pitchers, plain tumblers, gobblets, and so on in almost endless variety.

As all these pieces were made by the old blowing process, some of them show an occasional irregularity in contour or a slight misadjustment of the handle, that merely seems to give them additional charm in the eyes of the connoisseur. There are others that plainly reflect the individuality of the workman producing something without any need to adhere to a standard of size or proportion, and they are unusually interesting from this angle.

Some specimens are beautiful beyond the power of words to describe and only the most expensive color plates could serve to convey an idea of the warm shade of the rare amber mug, the clear deep green or blue of a cream pitcher, or the dark brown shown in some of the bottles, flasks and vases. Amethyst flasks are included in the collection that are valued at close to a thousand dollars each. They are about seven inches high, with fluted sides and narrow necks, and are so fragile that no surprise need be felt over their scarcity after the lapse of more than a century and a half.

Beginning of the American Glass Industry.

In 1639 glass was being made at Salem, Massachusetts, and in 1683 at Philadelphia, Pennsylvania, but no authentic specimens of these small industries have been preserved.

In 1732 two factories were operated in New York City, one in Connecticut in 1747, one in Brooklyn, New York in 1754, and one in Germantown, Massachusetts (now the city of Quincy) in 1760. All of these, however, were small affairs, for local trade, and of short duration.

The first factory of importance was started at Allowaystown, Salem County, New Jersey, in 1738. It was established by Casper Wister who imported four

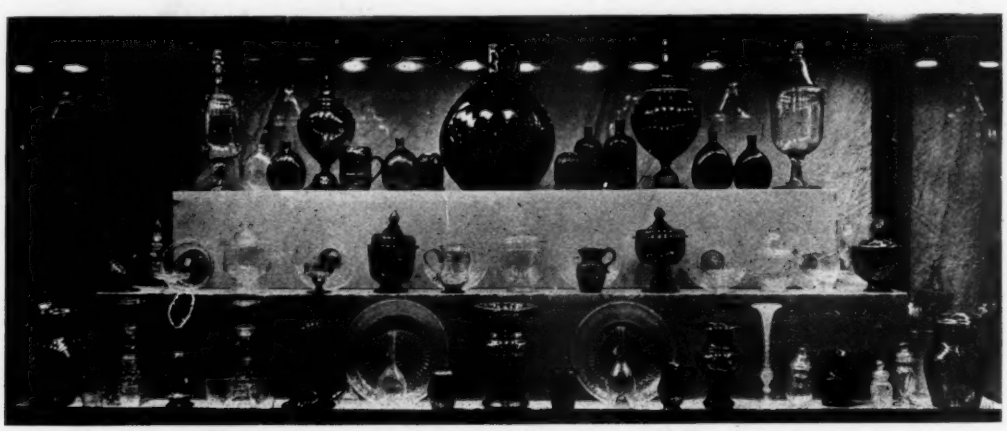


FIG. 1. CASE OF STIEGEL GLASS THAT CONTAINS MANY SPECIMENS WORTHY OF CAREFUL STUDY. VERY DIFFICULT TO PHOTOGRAPH OWING TO THE MANY COLORS AND REFLECTIONS.

FIG. 2. A RARE AMBER MUG, HIGH SALT CELLAR, BLUE VASE, TANKARD AND SUGAR BOWL MADE BY STIEGEL.

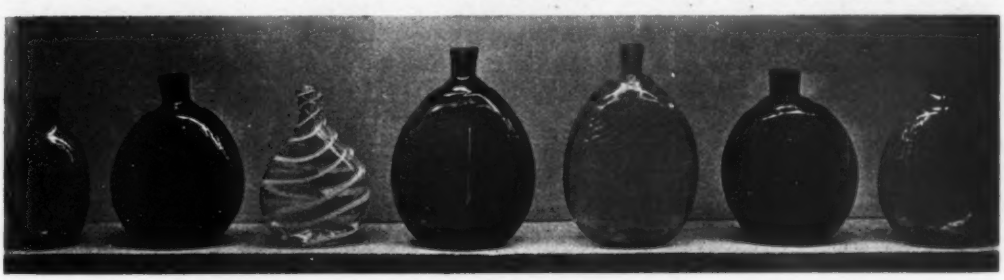


FIG. 3. STIEGEL POCKET FLASKS. THE ONE WITH WHITE STRAPS IS A DOUBLE BOTTLE THAT WOULD CARRY TWO KINDS OF LIQUID, VERY RARE. THE SECOND ONES FROM EACH END ARE THE RARE AMETHYST FLASKS.

FIG. 4. GLASS MADE AT THE PITKIN PLANT AT EAST HARTFORD, CONNECTICUT, ESTABLISHED IN 1783. NOTE THE QUAINT CRUETS AND THE GRACEFUL DESIGN OF THE WATER PITCHER.

FIG. 5. VASES, PITCHERS AND DECANTER MADE AT WISTERBURG, N. J. THE HOLLOW SPHERE SERVED AS A LID FOR THE PITCHER AND ALSO ENHANCED ITS VALUE AS A "SIDEBOARD ORNAMENT." THE STOPPER OF THE DECANTER IS SURMOUNTED BY THE FIGURE OF A ROOSTER.

skilled workmen from Rotterdam for the manufacture of bottles and window glass. There is nothing on record to prove that this factory made table glass, but collectors and curators have always considered that some of the beautiful old specimens found in this locality are Wister products. Several specimens of table glass in the possession of Wister descendants go far to substantiate this belief. The same inference may be drawn from advertisements in the "Pennsylvania Chronicle" of July 31, 1769, and the "Staatsbote" of September 30, 1765, which were inserted by Richard Wister, son of the founder, who kept the plant working until the financial depression of 1780. Eighty pieces of this "Wisterburg" glass are catalogued in the Temple Collection.

The most famous establishment, however, was that of a native of Mannheim, Germany, Baron Henry

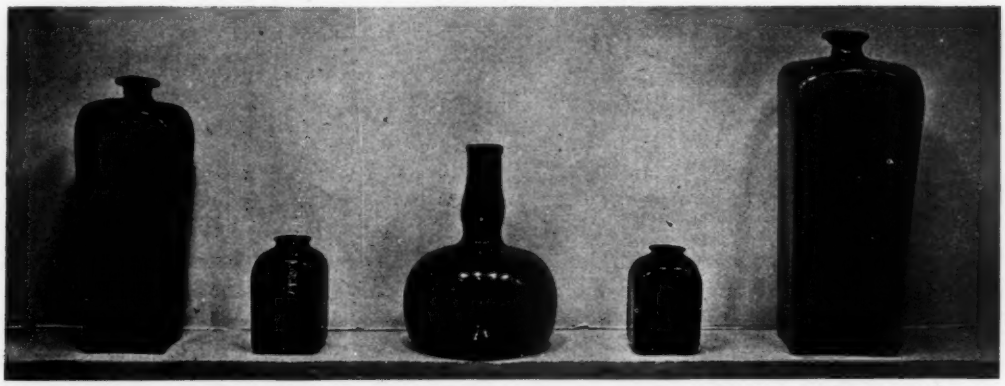


FIG. 6. HOW SUGGESTIVE ARE THE OUTLINES OF THESE ANCIENT BOTTLES! MADE AT THE WISTER PLANT.

William Stiegel, who came to Philadelphia in 1750. After engaging in the iron founding business for several years he purchased a furnace from his father-in-law, Jacob Huber, situated in Lancaster County Pennsylvania, and called it Elizabeth Furnace. This venture proved successful, however, in 1760 Stiegel began to experiment in making flint glass, and in 1763 started to market his wares in nearby Pennsylvania towns, such as Lancaster, York, Hanover, Harrisburg, and Carlisle. Stiegel's glass soon became famous throughout the Colonies and his business grew until in 1765 he established what was perhaps our first industrial town of the kind by laying out and constructing a portion of the present town of Manheim, about twelve miles north of Lancaster, Pennsylvania, named after his birthplace.

Introduction of Stiegel's glass in the great population centers of Philadelphia, New York, and Boston, combined with an embargo by the trade on imported goods to encourage American products, resulted in rapid expansion. Stiegel bought large tracts of land and increased the size of his factory, employing more than one hundred men in his glass house, until in 1774, at the height of his career, the glass business suffered a setback on account of the impending Revolution. Stiegel became a victim of over-expansion. He had borrowed heavily to finance his large business and could not weather the period of depression, finally becoming bankrupt and being imprisoned for debt. After his release he spent the remainder of his life teaching school. Thus ended the career of one of our early captains of industry, some of whose product is still preserved and treasured for its artistic excellence and historic interest.

Stiegel's workmen were imported from Germany, England, and and other parts of Europe and accordingly much of his glass resembles the foreign product of the same period.

There are a number of specimens of Millefiori glass in the Temple Collection. This derived its name from a cluster of flowers and is made by fusing together small glass rods of different designs and colors. These specimens were made in New Jersey at Glassboro, Millville, Milford, and Waterford, and take the form of paperweights, inkwells, canes, chains and lillies.

About the middle of the eighteenth century the making of Millefiori glass became a considerable industry in Bohemia, Alsace-Lorraine, and Bacaret, France. Many of the workmen who had learned the secret of making it made their way to England and America. Between 1850 and 1870 a large trade in these novelties was carried on until almost every house throughout New England and New Jersey had one or more of these objects for the writing desk or corner whatnot.

Also on exhibition are a few pieces from the East Hartford Glass Company, operated by William Pitkin from 1783 until 1830. Other items in the collection are bottles from Coventry, Connecticut (1813 to 1848); bottles from the Kensington Glass Works in Philadel-

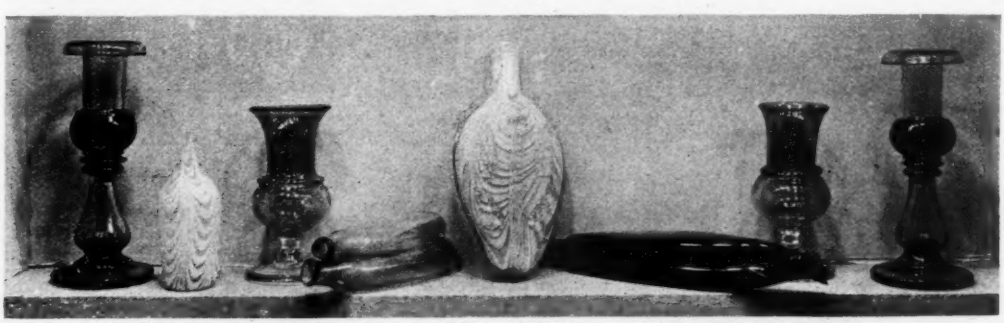


FIG. 7. CANDLESTICKS AND VASES FROM MILLVILLE, N. J., AND BOTTLES MADE AT WISTERBURG, N. J. NOTE THE "DOUBLE BARRELED" POCKET FLASKS—ONE OF THEM SUFFICIENT TO PROVIDE REFRESHMENT FOR A LONG TRIP BY STAGE COACH.

FIG. 8. STIEGEL ENAMELED BOTTLES. WINE FLIPS, TUMBLERS, AND MUGS OF GENEROUS CAPACITY WERE ALSO MADE IN SIMILAR DESIGNS.

phia (1771 to 1921); silvered glass from the New England Glass Company (1817 to 1831); and the Boston and Sandwich Glass Company (1825 to 1890). The last named factory is given credit for inventing and making the first pressed glass. Their product included pressed glass table ware, such as cup plates, lamps, candle sticks, sugar bowls, pitchers and similar articles, in all colors.

Other specimens in the collection whose age is a hundred years or more, represent the product of the Baltimore Glass Company established in 1790, Messrs. Blakewell and Company, Pittsburgh, 1824, and the Pittsburgh Cut Glass Company, 1809.

Pittsburgh is now the leading glass center of North America, although the glass factory started by Stenger Bros. at Glassboro, New Jersey, in 1775 and still in operation is the longest established glass factory in this country.

This plant, which is "one year older than the United States" now has single machines which can make as high as fifty thousand bottles per day without assistance from human hands, a remarkable development from the days of the old blow pipe, which was imported by the Egyptians from Asia Minor at the time of the Roman conquest and was the only glass making apparatus used by all countries until about 1840, when modern machinery with the advantage of more rapid and economical production began to displace it.

Part of this collection of early American glass was on exhibition for a time at the Pennsylvania Museum in Memorial Hall, Fairmount Park, Philadelphia, and it is probable that the entire collection will some day find a permanent resting place in one of our large museums, where the student of design, the antiquarian, and the artist will find inspiration in the quaintly beautiful craftsmanship.

The collection cannot be duplicated. Many of the specimens are the only known ones of their type and could not be replaced if broken. Their gathering was a labor of love and required 25 years of persistent search during which their present owner scoured the country in an automobile or carriage and attended many sales of farm household effects. He also had his representatives who assisted in the collection of this glass, as well as antiques of other kinds, and dragged forth many a precious piece from its hiding place in cupboard or garret.

It is to be hoped that the entire collection may be placed permanently on view in some public place where the student of art in industry may be able to examine it to his heart's content. Study of many of these pieces would be of incalculable value to the designer of pottery, or furnish just the right motif for the artist intent upon giving atmosphere to a picture of the period represented.

FIG. 9. A STIEGEL VASE IN BLUE GLASS, AND A BROWN URN AND BOTTLE THAT ARE PARTICULARLY INTERESTING.

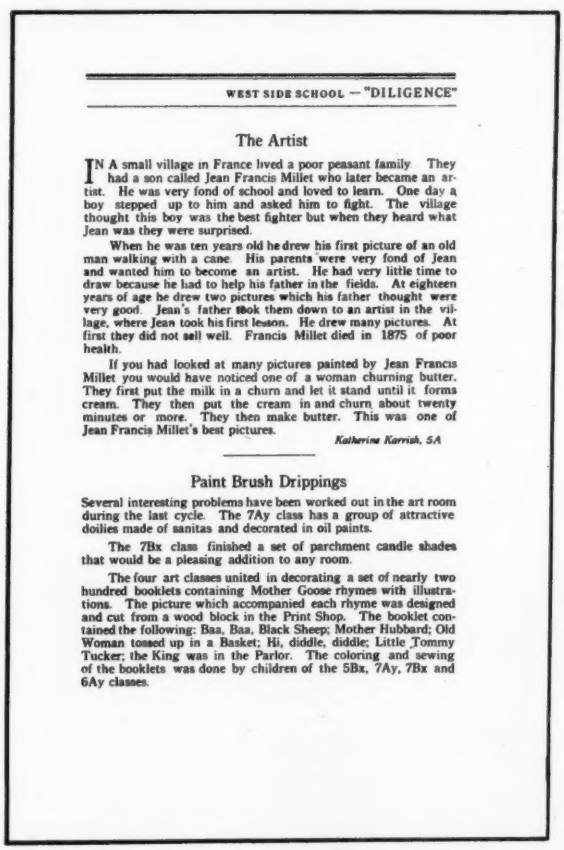
Publishing an Elementary School Paper

David Daniels, West Side School, Newark, N. J.

FROM practical experience in an elementary school print shop, I am of the opinion that publishing a school paper is about the most attractive, fascinating, and appealing project a school print shop can offer to energetic boys and girls. It is acceptable to educators because it is a problem in which the entire school takes part, also because it is a medium through which the academic department coordinates with the special activities. Through it, the school is afforded an opportunity to communicate with the parents, keeping them informed of the progress the school is making; and last, it creates an increased interest in nearly all school activities.

Does It Appeal to Energetic Boys and Girls?

What child will not rejoice when he reads his contribution or composition in print, especially if his composition was selected as the best from class work? What child will not feel honored and display profound joy when informed that through the recommendation of his teacher he has been appointed editor, business manager, or reporter for the present issue? He assumes a responsibility and is impressed with the feeling that upon him lies the success of that issue.



WEST SIDE SCHOOL — "DILIGENCE"

The Artist

IN A small village in France lived a poor peasant family They had a son called Jean Francis Millet who later became an artist. He was very fond of school and loved to learn. One day a boy stepped up to him and asked him to fight. The village thought this boy was the best fighter but when they heard what Jean was they were surprised.

When he was ten years old he drew his first picture of an old man walking with a cane. His parents were very fond of Jean and wanted him to become an artist. He had very little time to draw because he had to help his father in the fields. At eighteen years of age he drew two pictures which his father thought were very good. Jean's father took them down to an artist in the village, where Jean took his first lesson. He drew many pictures. At first they did not sell well. Francis Millet died in 1875 of poor health.

If you had looked at many pictures painted by Jean Francis Millet you would have noticed one of a woman churning butter. They first put the milk in a churn and let it stand until it forms cream. They then put the cream in and churn about twenty minutes or more. They then make butter. This was one of Jean Francis Millet's best pictures.

Katherine Korrish, 5A

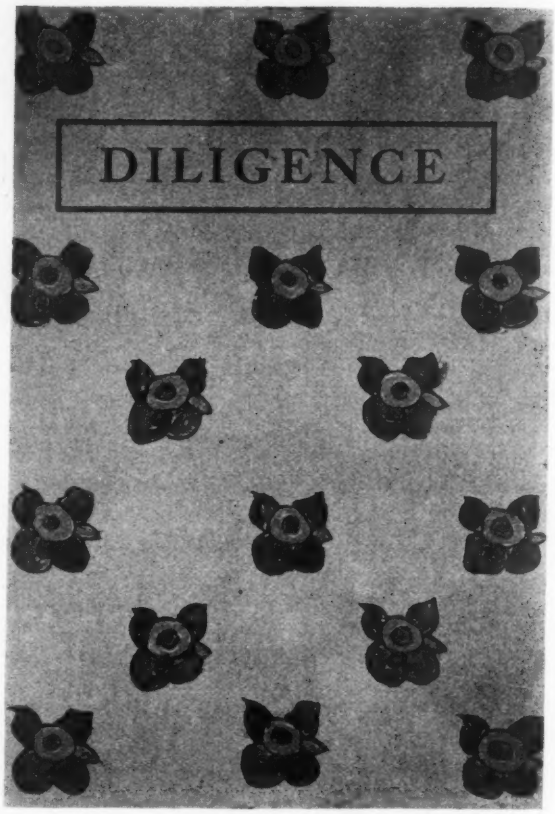
Paint Brush Drippings

Several interesting problems have been worked out in the art room during the last cycle. The 7Ay class has a group of attractive doilies made of sanitas and decorated in oil paints.

The 7Bx class finished a set of parchment candle shades that would be a pleasing addition to any room.

The four art classes united in decorating a set of nearly two hundred booklets containing Mother Goose rhymes with illustrations. The picture which accompanied each rhyme was designed and cut from a wood block in the Print Shop. The booklet contained the following: Baa, Baa, Black Sheep; Mother Hubbard; Old Woman tossed up in a Basket; Hi, diddle, diddle; Little Tommy Tucker; the King was in the Parlor. The coloring and sewing of the booklets was done by children of the 5Bx, 7Ay, 7Bx and 6Ay classes.

TYPE PAGE OF PAPER PRODUCED BY THE AUTHOR'S STUDENTS.



BLOCK PRINTED COVER PAGE OF DILIGENCE.

The school paper enables teachers to introduce in their work some real, live practice. An account of the baseball game, comments on a talk given in the assembly, how to make bread pudding, the progressive steps in making a dress, happenings in the manual training shop, are subjects which require the pupil to write from observation, and to bring out an expression of his thoughts.

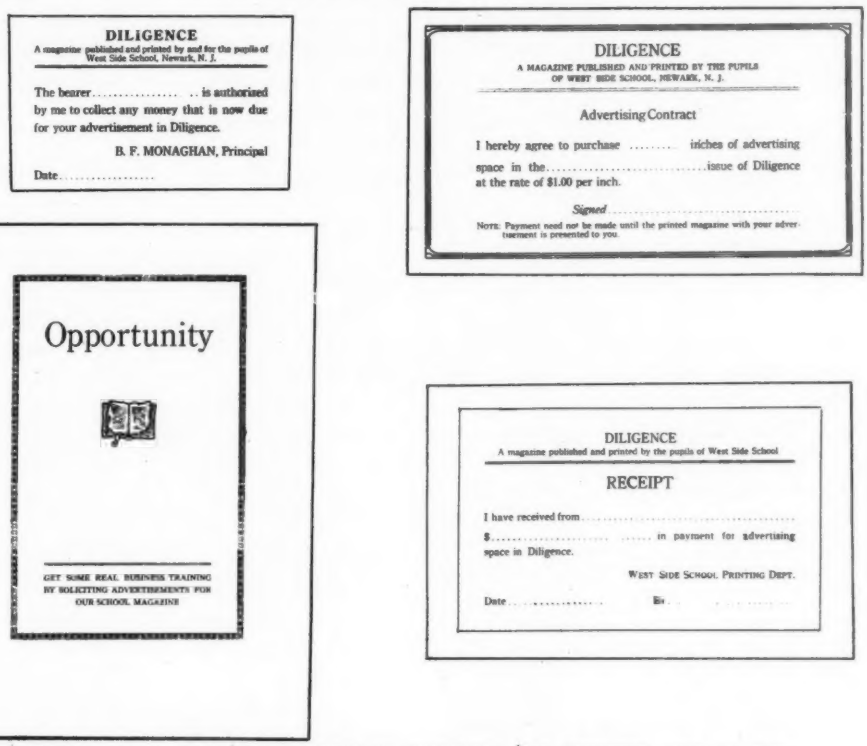
Let it not be understood, that although most of the writing, typesetting, proofreading, and printing will be done by the students, very close supervision by the teachers is not essential. Teachers should suggest to the pupils what kind of copy is suitable for the publication. It may be necessary to stimulate interest at certain times when it is found to be lagging, if publication is to be maintained at regular periods. Last, but not least, teachers should insist that the pupils use correct English and write intelligently.

The School Paper Can Be Made Self-Sustaining.

The expenses incurred in publishing a school paper are: paper; photo-engravings; if lineoleum-block engravings are made, materials used to make them; stitching, if no stitching machine is included in the outfit; and

incidentials needed while the work is in progress. The proceeds of the sale of papers will partly cover this expense, but advertisements solicited by pupils is a means which can be depended upon.

Here is a splendid opportunity for students to get some real training in salesmanship. Advertisements should not be solicited with the idea that it is a help to the school. The student should be trained to present some good reasons why it will benefit the merchant if he advertises in the school paper, giving comparisons with other advertising media. Our school has been successful with this plan.


DILIGENCE
A magazine published and printed by and for the pupils of West Side School, Newark, N. J.
The bearer.....is authorised by me to collect any money that is now due for your advertisement in Diligence.
B. F. MONAGHAN, Principal
Date.....
DILIGENCE
A MAGAZINE PUBLISHED AND PRINTED BY THE PUPILS OF WEST SIDE SCHOOL, NEWARK, N. J.
Advertising Contract
I hereby agree to purchase ..... inches of advertising space in the.....issue of Diligence at the rate of $1.00 per inch.
Signed .....
NOTE: Payment need not be made until the printed magazine with your advertisement is presented to you.
Opportunity
GET SOME REAL BUSINESS TRAINING BY SOLICITING ADVERTISEMENTS FOR OUR SCHOOL MAGAZINE
DILIGENCE
A magazine published and printed by the pupils of West Side School
RECEIPT
I have received from.....
$..... ..... in payment for advertising space in Diligence.
WEST SIDE SCHOOL PRINTING DEPT.
Date.....
By.....

TYPICAL "JOBS" PRINTED TO ASSIST IN HANDLING THE BUSINESS SIDE OF THE SCHOOL PAPER "DILIGENCE."

To insure the success of the publication and to publish an issue at regular intervals, a staff should be organized. This organization will not only insure its success but will tend to equalize the work, and not place the burden upon a few individuals.

The first step, then, is to organize the staff—student and faculty—the latter acting in supervisory capacity. The English teacher, a member of the staff, should be requested to supervise the work of the editor and reporters. All copy is to be sent to that teacher where it will be corrected and prepared for the print shop.

The art department, under the supervision of the art instructor should prepare for each number a cover design to be printed from linoleum blocks. This will help brighten up the school paper a bit.

The printing instructor should attend to the mechanical work, instruct the business manager and his assistants, and attend to the details.

From the student body, there should be an editor and his assistant selected from the eighth grade, and reporters selected from each grammar grade. Their duties should be as follows:

Editor and Assistant Editor—
- Editorials to the students
- Special news articles
- Entertainments given by the school
- Visitors
- Alumni Notes
- Give reporters assistance, when needed
- Read proofs
- Athletic News

Class Reporters—
- Class Notes
- News of shops, sewing, and cooking
- Gather humorous matter
- Assist in the sale of school papers

Note: A box should be provided for contributions from reporters.

Suggested Copy—
- Compositions by pupils
- Special articles by principal or teachers
- Classroom Notes
- Printing an Honor Roll
- Athletic News
- Jokes pertaining to school life
- Alumni News
- School News

Copy should come in regularly disregarding date of publishing.

Business Manager and Assistants—

Solicit Advertisements and collect money for same

Take charge of the sale of the magazine and account to the treasurer for all money received.

Display posters prepared in the art department a few days before the school papers are put on sale.

Probable Advertisers—

Milk Dealers, Butchers, Grocers, Florists, Tailors, Photographers, Motion Picture Theatres, Music Teachers, Confectioners, Opticians, Banks and Bakeries

JOB CARD

Date _____

Nature of work _____

To be made for _____

Date promised _____ Extension _____

Date delivered _____

Pupil's name _____

FORM USED FOR "JOBS" IN THE AUTHOR'S SHOP.

Seasonal Work in Manual Training

Earl W. Thrall, Beloit, Wis.

SEASONAL work in manual training as I shall refer to it in this article means "taking care of the special work which the individual brings into the classes, as a result of the changing seasons of the year". I do not refer to this work as a definite assignment, to be planned a year in advance and to be worked on a certain day and in a certain way. Rather, I prefer to think of it, and use it as a stimulant to all classwork whether in the shop or drawing room.

Believing that no class nor no classwork, without interest, is, or ever can be successful I am sure we should always grasp any opportunity at any time, which furnishes its own interest.

The special job furnishees its own interest. In fact, interest is the creator of that job. The boy is thinking about this article and is interested in it long before he decides to satisfy this interest and desire by creating and building it and owning it himself. This is not copy work. Here is one of the few places where original ideas come to light except as they are forced by artificial stimulation of some kind. This model to a great extent represents the original ideas of the indivdual and to obtain this any boy will study well his construction and design. He will work hard on his drawings in order to convince you that he knows what he is doing, and he will work overtime to get this job done. Can we, as instructors, say as much for the work which we force upon boys as they follow our course of study? Any instructor who kills this existing interest and desire has lost a golden opportunity with the boy, and he will now be obliged to study this boy well and work long and carefully in order to overcome the handicap which he has forced upon himself.

A course of study is always a necessity, but it must be flexible at any and all points. It cannot be a hard-and-fixed course. The training of the mind through the hand does not depend upon following a rigid fixed order like a course in geometry * * * In our work, many roads lead to the same goal.

The success of any class or of any course of study depends entirely upon the interest which may already exist, or may be created, developed and stimulated by the instructor through his methods and system. If this interest does not exist among the pupils of your classes; if you cannot create it nor develop it; then you are not accomplishing your aim. Stop, now, and consider your methods. Keep the aim of your course always in view, but seek some means of creating interest in this movement.

Interest cannot be forced upon a pupil, neither can real interest be created in an instant. It must be developed as a natural consequence of events which have preceded it. In making definite and arbitrary assignments, great skill is needed by the teacher. Good judgment and a study of individuals as well as models, is necessary. Where definite assignments are made by the instructor, interest should be stimulated before work on the model is begun.

A boy's mind and fancies are "subject to change without notice". They change with the seasons, they change with the business of the local community, they change with the trend of the times. Last year he was interested in electricity solely on account of the wireless telegraph. Today, he has transferred his affections to the wireless telephone. It is still the same field, but the magnet of interest has moved to a different part or division of that field.

We can never make, nor find, a course of study which can be followed without continual changes to keep it alive and up-to-date, but there are conditions existing in nature and in the boy, which never change. Are not these then, things worth considering? Here are fixed conditions which we know will always exist, and the cycle of events is always repeated in the same order and at the same time of year. Nature has bestowed upon us the four seasons of the year, with their varied temperature, and their ever changing scenery; the balmy, growing days of spring; the hot, and busy days of sum-

mer; the crisp and yellow days of the harvest time; and the cold, keen days of snow and ice. Do not all of these affect the boy? Does he not change with the seasons, and do not his desires, his fancies, his work, his play, and his needs, all change with the seasons? Although the boy may not sense it in just this manner, it is the call of nature that it should be so. It is a natural instinct born with the boy. The things he wanted, and the things he wanted to do in summer are not what he desires in winter. Conditions are changed, the needs are changed also.

Why, then, do we not build our course of study around these conditions, or at least make it flexible enough to take care of the demands of the changing seasons at the proper time? We must not lay down a hard-and-set course of study, which is not in harmony with the laws of nature.

Seasonal work must always be cared for at the proper time. Good results should be practically assured because the greatest asset, namely interest, is already present from the beginning. In this work, advice and guidance are needed from the instructor; nature and the boy will take care of the balance. It may not always be possible to gratify the desires of the boy as well as to cover the succeeding model in your lesson plan, all in a single model. However, it is a poor model which does not teach something. The small boy suddenly wants a windmill. Is not this your golden opportunity to teach the half-lap joint? But, perhaps the lesson plan says he must make a butt joint first. What shall we do? Make the windmill, of course. He has to learn this step only once. The opportunity has presented itself and let us take care of it, then and we can teach the butt joint with the next model. There is a time for everything and we should endeavor to gain an advantage whenever opportunity presents itself.

The special job and the repair job both have their place in our work. To the boy, these look like real business. He is doing work now which a mechanic might be called upon to do. Mentally, he figures the cash value of this job, and is proud that he is able to do the work as well as a paid mechanic. Real interest is present here and he is doubly paid for his work. He has accomplished something and he is pleased and he has also saved the expense. The repair job has well served its purpose.

In arranging our lesson plans, let us have a large group of models to choose from for each step in our plans and be sure to include models which are typical of the current season of the year. If your groups are large enough, every member of your class will select a model in which he has a special interest for some reason of his own.

We should study the developing minds of these boys and keep pace with them. Are we as sensitive to "the call of the wild" which comes in the springtime, and to the sports which winter ushers in, as are these boys in our classes? If we are not interested in their work, shall we expect them to be interested in our work? We want to develop and broaden the boy in every way we can. We are not operating a trade school. We are aiming at the boy and not at the trade.

Every boy knows that there is a place before him in the community which he is expected to fill later on in life, and it is his business through his boyhood days, to fit himself to fill that place. He learns by doing and his experiences are measured by success or failure.

We live in an industrial age and in an industrial country. Our school systems have been accused of educating the young away from industry instead of fitting them for the industrial world, which now demands men of high professional training. Let us be sure we are doing our share toward giving these young fellows a fair start in the busy world today.

On the Delphic Temple, was engraved this motto "Know Thyself", and Socrates used this as the fundamental in all of his teachings.

He is reported as saying "know thyself, that is realize thyself, and be in fact, what thou art in possibility", and so we should look upon the boys in our classes, and study them, and know them, and endeavor to make them in fact, what they are in possibility.

The Organization and Administration of Part-Time Schools

S. J. Vaughn, President of Hardin Junior College, Mexico, Mo.

THE essential fact concerning the organization of the part-time school is that very much of the organization must be completed well in advance of the opening of school. There are so many complications that will arise; there are so many unsuspected minor considerations to be dealt with that the attempt to open the school without first clearing away these minor difficulties would end in confusion. And, at best, the part-time school problem is an extremely confusing one.

The first definite step is the organized means of getting the proper information to the public in general, to the boys and girls and their parents, and to the employers for whom the pupils are working.

The indispensable service which the local newspapers can render and which they are glad to render in putting the information concerning the provisions of the law and the value of such schools before the general public need hardly be discussed. Such a campaign of publicity must, undoubtedly, be started some weeks before the attempt to open the part-time school.

Another agency of proper publicity is the local Chamber of Commerce or similar organization. Such bodies are almost invariably glad to cooperate in such

a movement to the extent of sending letters of explanation to their members. Such letters should, of course, be prepared in conference with the local director of the part-time work. In this way the proper interpretation of the law and the needs of the new work and the employer's relation to both will be assured. It is doubtless advisable in such a letter to stress the effect of this new education upon the citizenship and general improvement, as well as upon the vocational significance.

If in the community there should be a Manufacturers' Association, a similar letter could be secured from its secretary to its members.

The next, and perhaps the most vital step in the whole publicity program, is the visit by the administrative officer to the employers. There are a number of purposes for such a visit. In the first place, it is one of the means of getting a proper list of the juvenile workers. The beginning, of course, is the school census. Almost invariably, however, such a census proves to be almost entirely inadequate for the part-time school purposes. In one city in the middle west the school census showed a list of 175 pupils within the part-time school age. At present in that city there are six hundred pupils in attendance and the number is steadily increasing. Another reason for the visit to the employers is the cultivation of the spirit of cooperation among the employers, and this is no small matter. Without their cooperation the part-time school will face endless and annoying difficulties. The attitude of the pupils will, to a considerable extent, be determined by the attitude of the employers. Furthermore, the law makes it entirely optional with the employers whether or not they shall pay the workers for the time spent in school. The administrator who visits the employers for the first time must be prepared to listen to rather wholehearted and bitter criticism of the public schools. Some of them are based on an element of truth, and some of them, of course, are simply distorted imaginings, but whatever they are, they are deep-seated and must be met. It gives the schoolman, therefore, an opportunity to meet in a diplomatic and constructive way the criticisms advanced. The visit will, furthermore, give an opportunity to discuss with the employers the most convenient days and hours for the workers to attend school. Very naturally, the attitude of the employer is at first antagonistic to the whole scheme. He unhestitatingly declares it impossible to conduct the business if it is to be broken into constantly by the taking away of the young helpers. However, after the proper discussion of the matter, any tactful administrator can establish the need of such a school and both the advisability and practicability of arranging for attendance. During this same visit the employers can be further cultivated by conferring with them concerning the kinds of work which the school can profitably offer to the youthful workers who are employed in their concerns.

The next step in the long process of getting a part-time school established is to visit the homes of the boys and girls who must, under the law, come back to school. Here again the school official must be prepared for an attitude of hostility. The parents of those types of boys and girls who quit school early and go to work are almost invariably ready to justify themselves by condemning the schools, by asserting that further education was unnecessary by questioning the right of the state to compel longer attendance, and by falsifying the ages of their children. When one has returned from such visits in the homes, one is considerably in doubt as to whether any good has been accomplished, but, on the whole, it seems the most effective way to get the proper information to the parents. Furthermore, by a most discreet handling of the matter the attitude of hostility can be either overcome or materially modified. A perfectly plausible case can be made for the value of further educational work on the part of the boys and girls, and definite examples can be used to advantage in convincing the parents of the advisability of additional schooling. Finally, the penalty of the law can be set forth in such a manner as to be deeply impressive.

Registration of Students.

After the proper publicity through newspapers, letters, and visits, the time comes for registering the students. Likewise, the registration would seem to be necessarily well in advance of the opening of school. In preparation for registration day the school officials will find it advisable, if not entirely necessary, to send notices not only to the boys and girls whose names are on the list of eligible pupils, but also to their employers. The most effective notice to the employers is the one which sets forth not only the day of registration but also the names of the workers in that concern who are due to attend.

It has been found advisable by those of longest experience to provide for registration both in the buildings where the particular students are to attend and in at least the larger of the establishments in which the children work.

Classification a Baffling Problem.

Perhaps the most baffling question of the entire part-time school is that of classification. The first impulse is to classify the pupils on the basis of their previous school work, and many part-time schools have been started on this basis. Since the pupils of from 14 to 16 years of age range all the way from the third grade, or lower, to the third year of high school in point of previous work, it would seem, on the face of it, almost impossible to classify them on any such basis. Perhaps we will decide sooner or later that the intelligence test, imperfect though it may be, will offer the best basis for classification, so far as capacity for advancement is concerned. Indeed, it has been fully determined in the schools of longest experience that so far as shopwork is concerned there may be but little difference in the part-time school between the student who quits school in the seventh grade and the one who remained to the sophomore high school year. So the

grade scheme of classification seems wholly unreliable for the purposes of this new organization.

Among the other considerations beside that of mental capacity to be taken account of in classification may be mentioned the conscious needs of the individual, his imagined needs, the unquestioned needs from the standpoint of the community, and certain desires on the part of those who employ the pupils. If attempt should be made to meet every real or imagined need of the pupils, the employers, and the instructors, it would require an almost hopelessly elaborate organization, equipment, and teaching force. In the commercial and industrial pursuits alone, in a moderate-size city, there have been calls for from fifty to sixty separate and distinct lines of work.

When the pupils have definitely determined upon a recognized occupation in the commercial or industrial field, it would seem not only the desirable, but the logical thing to relate his school work as nearly as possible to his daily occupation. This is not wholly a vocational consideration. It seems the most obvious avenue to the interest of the individual, and in the commercial lines it is not an extremely difficult matter to provide both facilities and a teaching force. When the industrial field is reached, however, the variety is so great and the occupations are so highly specialized that it seems not only inadvisable but almost impossible to provide for many of the specific needs. It would seem, therefore, wise to make provision for certain fundamental occupations in which experience may be given both for the purposes of trying out the likes and aptitudes of the pupils and for the giving of definite trade extension work.

At the beginning of the attempt to classify the students it has been found advisable to deal at separate times with the more or less well defined groups into which the pupils fall. Perhaps those that have had some high school work should be dealt with at one time, those that finished the grammar grades at another, and those who fell by the way long before reaching the eighth grade at another.

Even after this much of the classification has been accomplished, there are two well established methods of proceeding. One is to put all new students into an entry, or a so-called reservoir, class. In such class or classes the pupils are put through similar experiences in various lines of work. This gives the teacher the opportunity to observe the pupils at their work, to take account of their apparent aptitudes, and to take note of the obvious misfits. In all this work the teacher's visits to the places of work and to the homes help to verify the conclusions based upon the class experiences. During a limited time, anywhere from two to six weeks, the pupils are supposed to find work to which they are best adapted and in which they are most vitally interested. When they have thus found their work and their interest, they are organized into classes in the lines for which they have shown the greatest aptitude and interest.

In the other method of procedure the classes are organized at the very beginning and the pupils are started on the work which they are supposed to pursue. Of course liberal chances are given in either case to transfer from a type of work for which they seem unfitted to something that more nearly meets the needs and aptitudes of the particular students.

Thus far it has been considered largely from the standpoint of the commercial or industrial activities in which they may engage. A very large percentage of the part-time pupils, however, are in need of what is known as general continuation work; that is, such work as resumes the school subjects that were dropped when they left school. In this case, as in the other, a very large part of the work will necessarily be on the individual basis. The variety is so great, the aptitudes are so diverse, and the school experiences are so different, both in point of time and character, that it seems well-nigh impossible to deal with them in the mass.

It is well to remember, furthermore, that new pupils are daily entering the part-time school and that the old ones are dropping out as they reach the age of 16, hence the matter of classification is a perfectly continuous process. It would seem, therefore, to be necessary to organize the work of the part-time school in perfectly definite units to be completed in a definite and limited period of time. This does not preclude the idea of an instruction order. It simply suggests the instruction order in the arrangement of the units week by week.

At best, within a very limited time after the beginning, it will be found necessary to make many and radical readjustments. In some cases almost a complete reorganization has been found necessary, due to a lack of complete information concerning the work of the pupils. For a perfectly intelligent classification and assignment to work it would seem wholly necessary to know in great detail just what the work is in which the individual is engaged and exactly what his duties are in connection with that work. Perhaps this is the most difficult item of information to get, and if left to the individual pupil to furnish the detailed information very unsatisfactory results will be had. Perhaps the only sure way of getting sufficiently accurate information concerning the pupils' work is for the school official to get the data on the visit or visits to their places of employment.

Schedule of Days and Hours.

In the conferences with the employers it is well to get a perfectly clear understanding with them as to the most convenient times for the pupils to be absent from their work. Quite generally, especially in the commercial and sales work, the employers are quite averse to Saturday classes; hence, it is just as well to avoid this difficulty at the very outset. Where the time is eight hours per week, as it will be in Illinois, the most satisfactory arrangement, both from the standpoint of the

school and of the employers, is the two-shift arrangement; that is, each pupil will come to school on two different days, spending four hours on each day. The usual arrangement is for the pupil to spend the morning of one day and the afternoon of the other day. In this manner the employers are not under the necessity of leaving the same machines idle at two different times. Thus the loss of service would be distributed. In those states where the four hour per week schedule is in operation it is much more satisfactory from the standpoint of all concerned to have the four hours of school work in one-half day for any particular pupil.

Administrative Organization.

The concensus of opinion is that the part-time school problem in centers of considerable population is sufficiently complicated and is sufficiently distinct from the regular school to make a special part-time director or administrator desirable, if not entirely necessary. Hence in many of the larger centers the administrative officer is an assistant superintendent in charge of part-time schools. In some places a director of part-time schools is appointed. In still others an assistant is appointed to the high school principal and placed in charge of the part-time problem. In all these arrangements there is no decided division of opinion.

There is one phase of the part-time problem, however, that excites the most spirited discussion, and that is as to whether the part-time school shall be a separate and distinct institution under a separate control, or shall be simply a part of the regular system and an element in the regular high school. Those who contend for the separate facilities and administration point out that the part-time school is essentially different in every way from the regular public school. It must be dealt with, they say, in a wholly different way. Especially in the vocational aspects of the part-time school the contention is made that the purposes and traditions and facilities of the regular high school are all distinctly inconsistent with the aims of the part-time school. There is a feeling, moreover, that by combining the part-time school with the regular high school the former would be essentially hampered in its activities. Furthermore, in undertaking the work as a part of the regular high school, attempts are quite generally made to use the regular teaching force of the high schools in the part-time classes. This, contend the advocates of the separate scheme, would certainly destroy the purpose and efficiency of the work, especially in those lines designed to be vocational.

On the other hand, the advocates of the unit element, whereby the part-time school is housed in the same building with the regular high school, emphasize the principle of democracy in education. They contend that it is essentially undemocratic to take groups of boys and girls from the working world and deal with them as a separate unit in our educational system. They are disposed to feel that the greatest influence in the matter of social values and preparation for citizenship in a community is exerted by the mere association of the part-time pupils with those in the regular high school classes. The association, of course, for the most part, does not occur in the classroom, but rather in the gymnasium, on the playground, in the assembly hall, in social functions, in the corridors, and in those general contacts of student life in the same institution.

So far as the part-time school in 1921 and 1922 is concerned, the essential considerations are: First, tiding boys and girls over a very difficult period in their lives; second, keeping the mind plastic and preserving those school arts and skills acquired in their previous attendance; third, giving boys and girls of this difficult period all possible advice and guidance and help in the selection of proper work for their future; fourth, providing at least a start in the preparation for the selected future work; fifth, providing through all these efforts as much general education as possible that will function in the making of better citizens.

It will be seen, therefore, that, for the present, the ideals of the part-time school are essentially one and the same with those of the regular high school. Therefore, the question of separate or unified management is a question of method. It is a question of the best means by which these perfectly worthy objectives may be attained.

Granted sufficient room, adequate facilities, and a competent teaching force for the very special lines, the unified arrangement undoubtedly has many advantages which the separate plant would not furnish. These advantages, to be sure, are on the side of the social contact, the democratic intermingling, and the consequent training for citizenship in a community. The separate scheme undoubtedly has the advantage in cases of intensive effort in the direction of vocational efficiency, but under the proper arrangement there is no essential reason why the same ends may not be reached by the unified scheme.

The Organization of Teaching.

The entire scheme of organization and administration must, in the very nature of things, be somewhat dependent upon the method of organization for teaching purposes. This phase of the work is just in the process of formation. In the states where the part-time work has been in existence for some time, two rather distinct ideas are in use. In the one case the departmental plan is the basis of the teaching scheme. In the other the plan of the single teacher for a limited group of pupils is being used. Under the departmental plan the regular scheme in operation in the high schools is being used. The feeling is quite general now that the defects of the departmental teaching are tremendously exaggerated in the part-time school. This much is true: For a great percentage of the part-time pupils the ordinary procedure of the school seems not to bring a sufficient reality to hold the attention and get the best results. Consequently it seems that the departmental or subject organization over-formalizes the work and

renders it so abstract as to be ineffective for the purposes of this class of pupils.

In some organizations the project idea has been adopted in its most extreme form. Under such an arrangement the individual is put into the shop or industrial or commercial work as a center for all activities. The same teacher that teaches the shopwork gives the instruction in mathematics, science, and English. The presumption is that these academic elements will receive the proper attention at the time when they become vital to the project in hand. This is open to the very grave charge that those elements of general culture so necessary to citizenship and social life are seriously neglected, or at least subordinated to the casual and sometimes accidental demands of the industrial or vocational work. The reply which the advocates of this scheme make is that whatever the students get of those elements of general education they get in vital contacts with real situations in life.

Under such conditions, they say, the student gets these necessary elements of general education in a way that fixes them permanently in their minds and experiences, whereas under the separate departmental arrangement the so-called subjects remain abstract, unrelated, and foreign. Without doubt, the one teacher-project arrangement has many elements of real strength, but it would seem that its success would depend wholly upon the unusual endowment, preparation, and versatility of the teachers who must handle the work. At the outset, at least, it would seem advisable to concentrate the efforts on the satisfactory organization, the skillful classification of the pupils, the elimination of all possible uninteresting and abstract material, and the securing of the most skillful, sympathetic, and versatile teachers that can be had. Then, as the work proceeds, attention can be turned to the possibility of changing the teaching organization from the subject scheme to at least a modified system of project teaching.

A Model Steam Engine as a Shop Project

Frank Moeser, City School Department, Buffalo, N. Y.

(continued from September)

Main Bearing.

The base of the main bearing was faced off by grasping it in the chuck of the lathe. A center drill was used to drill a center hole in the face, and by inserting the tail stock center of the lathe a rigid job was produced. It was necessary to see that the face was running true. This could be accomplished very easily by changing the position of the chuck jaws. One cut was enough as no particular thickness was required on this part.

After the base had been faced true, the bosses or bearings were laid out to the proper height. It was then clamped upon an angle plate; the bearings were set square with the table to have the shaft hole in the center of each bearing.

A 9/16″ hole was drilled through each bearing and reamed out with a ⅝″ reamer. While the bearing was set up on the angle plate, a spot facing tool was used to face off each side of each bearing. All that remained of the machine work was to drill the screw holes in the base and to drill and countersink the oil holes in the bearings. The operations are as follows: (1) Chuck up true; (2) center up the base with a center drill; (3) face off true; (4) lay out bearing holes and square up on the angle plate; (5) drill, ream and face the bearings; (6) lay out, drill and countersink the oil and screw holes.

Crank.

The crank can be made in either of two ways shown at A and B in the detail drawings. If made like the drawing A, a groove can be cut in the center of the outside rim which can be used for a belt to drive various small implements. Either crank will work on the engine but that shown at A requires a few more operations.

Type "A" Crank.

Grasp the crank in the chuck by placing the hub between the jaws. Face off the outside and turn to the diameter. Drill a 9/16″ hole through the center. Bore out this hole until it runs true and ream it with a ⅝″ reamer. Press the crank on an arbor, face the opposite side and turn the hub true. Cut the groove for the belt and remove it from the arbor. Lay out the crank pin hole, drill with a 31/64″ drill and ream with a ½″ reamer.

Type "B" Crank.

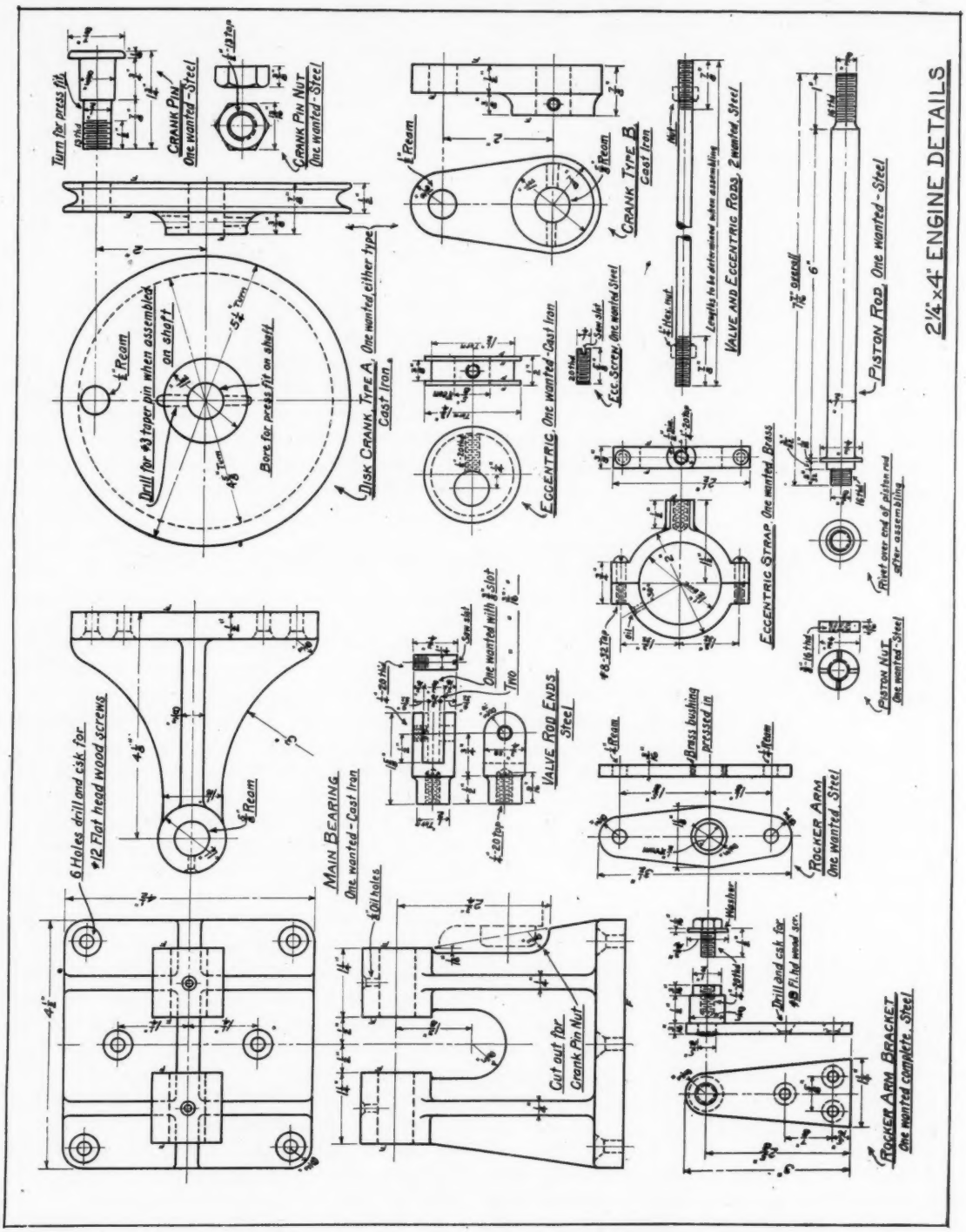
Grasp the crank in the chuck as described above. With the exception of cutting the groove, this type of crank is finished in the same way as the type "A" crank, which is as follows: (1) Chuck up true in the chuck; (2) face the side and turn outside diameter; (3) drill, bore and ream a hole; (4) press on the arbor to face the opposite side and cut a groove; (5) lay out, drill and ream the crank pin hole; (6) grind and file the outside edges smooth. The sixth operation is only for the type "A" crank.

Rod End Pins.

The rod end pins were made in the same manner as described for making the valve rods. After threading to the proper length, they were placed in the drill chuck, the ends were rounded off with a file and polished with emery cloth. The screw slot was cut in with a hack saw.

Valve Rod Ends.

The ends for the valve rods were made from ¾″ square cold-rolled steel, cut from a bar. Each piece


2¼×4" ENGINE DETAILS
Turn for press fit.
Crank Pin
One wanted - Steel
Crank Pin Nut
One wanted - Steel
Crank Type B
Cast Iron
Valve and Eccentric Rods, 2 wanted, Steel
Piston Rod, One wanted - Steel
Disk Crank, Type A, One wanted, either type
Cast Iron
Drill for #3 taper pin when assembled on shaft
Bore for press fit on shaft
Eccentric, One wanted - Cast Iron
Ecc. Screw, One wanted Steel
Eccentric Strap One wanted, Brass
Rivet over end of piston rod after assembling
Piston Nut
One wanted - Steel
Valve Rod Ends
Steel
Rocker Arm
One wanted, Steel
Brass bushing pressed in
Main Bearing
One wanted - Cast Iron
6 Holes drill and csk. for #12 Flat head wood screws
Cut out for Crank Pin Nut
Rocker Arm Bracket
One wanted complete. Steel

was chucked up true in the chuck and the end turned to ½" diameter ½" long. The hole was then drilled in the end and tapped out with a ¼" tap. It was then removed from the lathe, the slot sawed and filed and the holes in the side laid out, drilled and tapped. The ends were rounded off on an emery wheel and filed smooth.

The necessary operations are: (1) Saw off three pieces; (2) chuck up true; (3) turn the end to ½" diameter ½" long; (4) drill a 13/64" hole 9/16" deep and ¼" twenty threads; (5) saw and file the slot; (6) drill and tap a hole in the side; (7) grind, file and polish.

Rocker Arm and Support.

The rocker arm and support were made from 3/16" x 1-¼" flat cold-rolled steel. A center line was scribed through the center and the radius on each end was laid out in the proper place. Most of the metal on the corners was removed by grinding on the emery wheel, after which the pieces were finished with a file

and emery cloth. The holes were then laid out, drilled and reamed. The center hole in the rocker arm was finished 1/8″ larger than required and a brass bushing was inserted in the hole. The reason for this was explained to the boys and a demonstration was given of the effect on working parts, when two pieces of like metal are worked together.

Eccentric.

The eccentric of the engine was first drilled and reamed in the drill press. It was then pressed on an arbor and the sides were faced to the right thickness. For finishing the outside diameter it was necessary to make a special arbor.

A piece of one inch round steel was cut four inches long and centered on both ends. It was then turned to 5/8″ diameter three inches long and both ends were faced off so that very little of the original center holes remained in the ends. To lay out the eccentric centers place the arbor in a V block and set the scriber of the surface gauge exactly in the center of the arbor. Scribe a horizontal line across each end of the arbor. When this line has been marked, rotate the arbor one-quarter of a turn and use a square to locate the line in an exact vertical position. Now raise the scriber of the surface gauge 1/4″ and mark each end as before. At the intersection of these two lines mark with a center punch and drill the holes with a combination center drill. If care is taken when drilling the center holes this arbor will do the work very nicely.

Care must be taken when pressing this arbor into the eccentric to see that the eccentric center of the arbor is in the right position. When it has been determined that the arbor is in the proper position, turn the outside diameter to size and cut the groove. Remove it from the arbor and drill and tap the holes for fastening to the shaft.

The necessary operations are: (1) Drill a 19/32″ hole, ream 5/8″, 1/4″ off the center; (2) press on the arbor and face the sides to the thickness; (3) press on the eccentric arbor and finish turning; (4) drill 13/64″ holes and tap 1/4″ twenty threads.

Eccentric Strap.

The eccentric strap required but very few setting-up operations. The holes on the two side lugs or bosses were first laid out and drilled with a No. 28 drill. The strap was then sawed in half and the side without the center lug was tapped out with an 8/32″ tap. The holes in the side lugs on the other half of the strap were drilled with a No. 18 drill, and the two halves were filed, fitted and screwed together.

The center lug and the end were then centered up and drilled with a center drill. It was placed between the centers of the lathe and the center lug was turned to 3/8″ diameter. This provided a gauge or stop which was very helpful when facing the sides. The strap was then grasped in the chuck and finished in the following manner.

By placing a small piece of steel between the strap and the chuck jaw opposite the end with the center lug, it was possible to bore the hole to the proper diameter and face both sides of the strap without removing it from the chuck which insured an absolutely parallel job. For the inside facing a hook tool was used.

The operations are as follows: (1) Lay out and drill the side lugs; (2) saw and fit up two halves; (3) drill the top half with a No. 18 drill and tap the bottom 8-32 tap; (4) center both ends; (5) turn the center lug to 3/8″ diameter; (6) chuck up true and bore a hole; (7) face inside and outside to the proper thickness; (8) drill the center lug with a No. 12 drill and tap 1/4″ twenty threads.

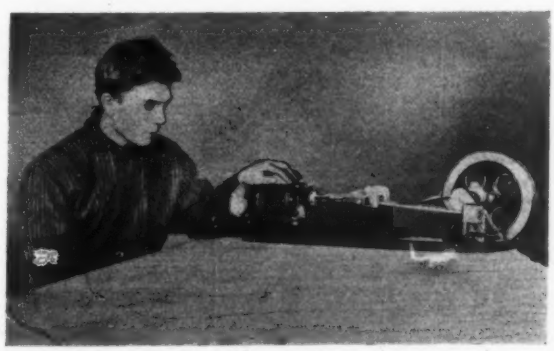
Crank Pin.

This can also be made in one of two ways. If it is made in the chuck as described under directions for the cross-head pin, more or less waste of material will result as there are very few small lathes with a spindle large enough to allow a 3/4″ rod to pass through the spindle. The best way is to make the crank pin and cross-head pin in one piece, allowing enough metal for parting in the center.

The successive operations are: (1) Center both ends; (2) rough turn all diameters; (3) finish turn all diameters; (4) cut the threads on both ends; (5) face off 3/4″ end on crank pin, file and polish; (6) face off end on cross-head pin and cut the screw slot.

When facing off the ends of these two pins, it will be necessary to grasp them in the chuck on the finished parts. In order to avoid the marring which would ensue, a thin piece of tin or brass should be wound around the pins before they are placed in the chuck.

(To be concluded.)



ENGINE PRODUCED BY ONE OF THE AUTHOR'S STUDENTS.

Business Management of an Industrial Arts Department

Burl N. Osburn, East Junior High School, Sioux City, Ia.

PROBABLY no business could be successfully run with so little regard for business methods as the average industrial- or manual-arts department. Strict accountability is the exception rather than the rule. Systems in use run the gamut from the "memory plan" to very expensive and complex systems. If a curve were to be plotted showing the distribution of departments with regard to their business methods, the skew of the curve would no doubt be near the memory method.

There are several factors which seem to contribute to this condition, such as: (a) The lack of standardization; (b) insecure and short tenure of position on the part of the teachers; (c) inability of those in charge to devise and maintain a system.

The number of school departments having no system at all is probably equalled only by the number which have one that will not work. These unworkable systems are usually so because of one or more of the following reasons:

1. There is no definite purpose underlying the plan.

2. The idea was taken bodily from some other school and will not work in the new environment.

3. The plan was not worked out carefully on a basis of needs.

4. The human element was not considered. These systems usually make no allowance for possible variations that will arise; or, may require so much clerical work that they cannot be kept up-to-date and are finally discarded as worthless.

5. The system was too complicated.

A system to be successful must include the following essentials:

1. The plan must be clearly comprehensible.
2. A minimum of clerical effort must be required.
3. Useless data must be eliminated.
4. The plan must be easy of access.
5. No highly involved or interrelated parts must be permitted.
6. Forms of practical size and arrangement must be provided.
7. Adequate filing facilities must be installed.
8. Satisfaction must be assured to all, both pupils and teachers.
9. The operation of the system must not be dependent upon the memory of pupils or teacher.
10. Responsibility for all transactions must be fixed.

No fixed and invariable statement can be made of the details that need to be considered in any one sys-

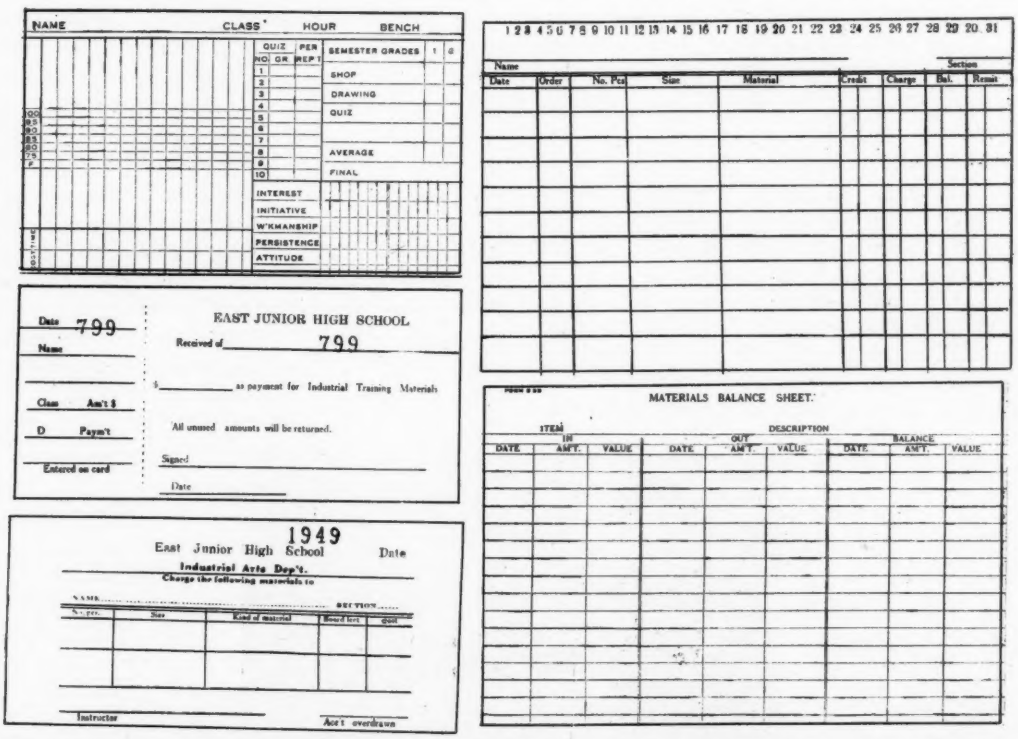


FIG. 1 (TOP LEFT). CLASS RECORD CARD. FIG. 2 (TOP RIGHT). PUPIL'S CHARGE RECORD. FIG. 3 (LEFT MIDDLE). RECEIPT FORM. FIG. 4 (LOWER RIGHT). STOCK CARD. FIG. 5 (LOWER LEFT). CHARGE SLIP, MADE OUT WHEN ISSUING MATERIAL. IT IS SIGNED BY THE TEACHER AND OK'D BY THE PUPIL.

tem, but there are a few that no sytem may omit. These are briefly records of (a) pupils, (b) materials, and (c) equipment.

A. Records Dealing With Pupils.

These include: 1. Attendance.

2. Work in progress.

3. Periodical grades (monthly, or some regular interval).

4. Administrative devices (a) list of bench numbers, (b) list of tool numbers.

All of these things may be kept in the standard class book, although many schools use some form of printed card such as is shown here. (Fig. 1.)

5. Permanent record of each pupil. This should be kept in the department, and should record courses, grades, credits, special abilities, work covered, etc.

6. Materials issued to each pupil. This matter is partly discussed under the heading of materials. Regardless of what method is used, there needs to be some record of every purchase, return of materials, or cash paid by the pupil. It generally simplifies matters if these records are kept together in a ledger, or on a card, in some manner, so that a boy may know at any time whether he owes the department money. If all accounts are left until the end of the year, there is too much work to figure then, and often it isn't done. A sample of such a record is shown in Fig. 2. The money paid in by a pupil should be balanced by a receipt. Thus the pupil feels safe and the department has an additional check. A receipt is shown in Fig. 3. All items on charge slips and all money as shown by receipts are entered on individual account orders.

B. Records Dealing With Materials.

1. *Requisitions* may be only blank paper, or printed forms, but should be made out in duplicate. In localities where the department sends out its own lists for bids, as many copies are needed as there are prospective bidders.

2. *Materials received by the department.* These may be listed in some manner together with the cost, date of receipt, etc. A ledger is convenient for this. Or items may be entered directly on stock cards similar to the one shown in Fig. 4.

3. *Materials issued.* Materials used for the department should be listed separately by jobs and the cost charged to installation and repair. Issuance of materials to pupils and charging them is generally the big problem. It is advisable to keep materials where pupils cannot get them, or let it be understood that they are not to help themselves. Any supplies should be given out by the instructor or someone especially appointed to do it. The record of the materials should be made *at the time* issued, and not later. Yet there is the rub, because to do this takes time and delays the classroom work of the teacher. If it can be done by a responsible pupil all well and good, but in case the teacher makes out the charge slip, if one is used, it should be of such a form as to require the minimum of time and attention. Such a one is shown in Fig. 5. These are copied on to the individual record cards. These might be made out by the teacher and O.K.'d by the pupil. In either case the slips should be filed and kept as a protection to the department.

4. *Periodical inventory.* This inventory may be taken yearly or by semester, and should show a classified list of all materials and supplies in the department and their value.

5. *Budget.* The regular budget consists of a list of all supplies that will be needed for the coming year. It is made out on the basis of materials needed for the courses and prospective enrollment.

Another form of budget is the "call" list. A pad of paper in some convenient place or a desk calendar will do for this. It consists of a list of materials or tools that are needed at once and that have not been included in the budget proper.

The "system" of allowing the pupil to get his own material and then figure it up later at the time he takes it home puts the premium on the waster, and is very inaccurate and costly. The cost of the department must be balanced and the pupil who uses the material should pay for it.

Several methods of payment are in use. Perhaps the most common is the coupon book. This has the advantage of requiring little clerical effort and is convenient in courses requiring a small outlay on the part of the pupil, providing some method can be devised of keeping it where it may be had when wanted.

These books have the disadvantages of: 1, being easily lost or destroyed; 2, being too often not on hand when wanted; 3, being inadequate for courses requiring a larger outlay.

In case of purchases exceeding the value of the coupons in the book, some method of carrying the credit must be used, or the time is wasted while the pupil brings the money. Carrying credit in these cases usually means in the mind, or on a convenient scrap of paper.

It is impossible to account for materials that are returned by the pupil, and for which he should receive credit.

Another system of payment in quite common use is that of charging a fixed sum as a fee from everyone regardless of what he uses. This is a convenient method as far as time required to keep it up is concerned, but it is unfair to those who are saving with materials. It is not conducive to careful planning or cutting, and often develops the spirit of "being sure I get *my* money's worth."

C. Records Dealing With Equipment

1. *Periodical inventory.* This should be made out at the beginning and end of every school year. It should not be only a classified list of tools and equipment, but should show the condition and estimated value of every tool or machine.

2. *Broken or lost equipment.* The cost of any broken or lost equipment should be applied to the account of the pupil responsible, and in case a ledger

account card is used, it can be entered just as any other item.

3. The most used item in connection with a record of tools is that of the *Current Checking System* by which a record is kept of tools in use during the class period. Many shops use the "open" type of tool case which requires no checking of the tools issued. Others use the "closed" equipment case which calls for a tool-keeper who issues tools upon request of pupil, or order from the instructor, and checks them in some manner. The closed equipment case is probably more satisfactory in most ways, although it is often too slow. Boys in a hurry to begin work are delayed in getting their tools (and an impatient boy is an additional problem), and at the end of the class period, tools are often turned in and the borrowers rush away before the tool-keeper can check them out.

Any of these objections holds true with any method which can be devised if the teacher is not strong enough to hold the class to its job, but the better and faster the system works, the less the necessity of any discipline.

The first requirement is to have the toolroom located in such a way that no delay is caused by boys conflicting with each other. Similar tools should be grouped together, those in most common use nearest to the tool window. Some method that will fix the responsibility for the borrowed tool must be used. This sometimes is done by having a panel with hooks holding checks, arranged in numerical order, one set of checks for each pupil. When a tool is borrowed, the tool-keeper puts one of the boy's checks on a hook near where the tool was removed. Another method is to have a common brass-bound price tag hanging near each tool, with the name of that tool on it. When the tool is borrowed, the tag is placed on a hook that is numbered with the boy's tool number.

STATEMENT FOR MANUAL ARTS

DEPARTMENT FOR SEMESTER ENDING _____

Value of supplies on hand at beginning of semester _____

Value of materials received _____

Value of materials on hand at end of semester _____

Net cash received from pupils _____

Value of materials used for instal. and repair _____

Cash received for broken or lost equipment _____

FIG. 6.

Finally, each department should attempt to balance its books periodically. It is not possible to account for every stick or penny, but a reasonably accurate balance can be found. A sample of what is meant is shown in Fig. 6.

In order to successfully apply any system to a department, it is necessary to select only those things to be recorded that are necessary in enabling it to keep an intelligent record of its transactions.

If possible, have all forms standardized in the school and printed, and most of all, remember that no system will run itself. It requires time and effort to keep up if it is worth while. In fact, it imposes that as an obligation.

MACHINE SHOP IN ROCK ISLAND HIGH SCHOOL, ROCK ISLAND, ILL.
Mr. A. W. James, Supervisor.

Home Made Machinery for Manual Training Shops

Charles W. Frost, Philipsburg, Mont.

THE possibility of supplementing the factory built equipment of the manual training department with inexpensive, home-made machines and appliances was suggested by finding such a "home made" circular saw in the manual training department of Granite County high school.

This machine, built by Mr. Harold Durst, a former teacher of manual training here, had been in use three or four years, and was still doing as good work as any factory-built machine after a similar period of service.

Ripping, cross-cutting, dadoing, sawing angles and tenons, and in short, anything that can be done on an ordinary circular saw could be done very nicely with this machine. Owing to the thinness of the saws used (which Mr. Durst had filed from Disston hand saw blades), this little machine did better work in cutting hard, thin, lumber and veneer than any power saw with which I am familiar. It would rip and cross-cut stock up to one inch in thickness easily and quickly.

A careful study of the methods of construction employed proved that it would be quite feasible to build other machines, needed for the department, at a fraction of their cost if purchased from the factory. This was a very important consideration, for while the school board would not consider purchasing such machines at this time, it had no objection to the use of the small amount of lumber and hardware required to build them.

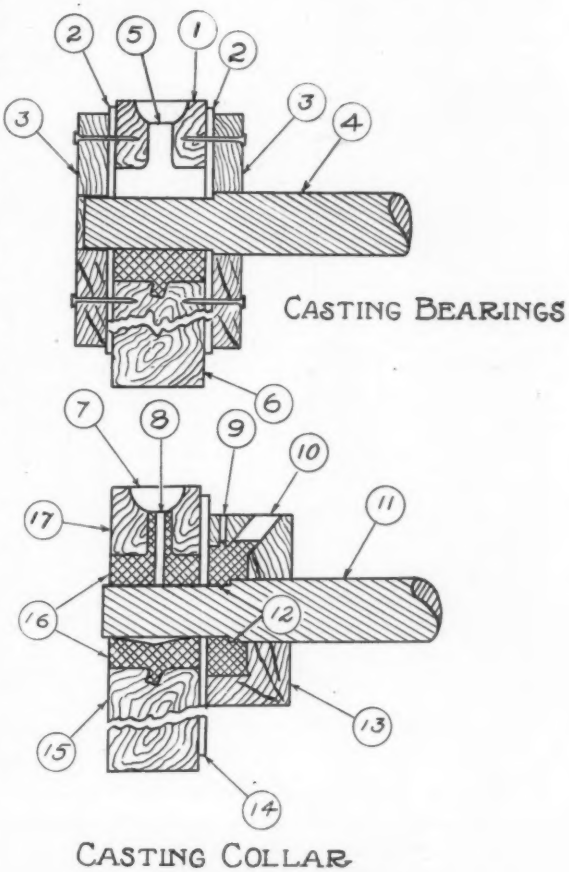
The machines so far made and in regular daily use, are, a jig saw, a combination spindle-sander and disk trimmer, and a belt sander. A swing cut-off saw will also be built. In the following pages are drawings showing details of construction, lists of materials required with prices paid, and wherever it is thought that such would prove helpful, suggestions as to procedure.

Dimensions of different parts and other details, may, of course, be changed to suit the requirements of the builder, or as the limitations of the materials on hand make necessary.

The same general methods of construction were carried out in all the machines. The frames are all built with post 3½ inches square connected by rails of various widths, but all one and a half inches thick; with tenons five-eighths of an inch thick by two inches long. Half inch dowel pins are glued through the posts and tenons at each joint, and the frames are also reinforced with three-eighths inch carriage bolts wherever the use of such bolts will add strength or rigidity to the machine.

Shafts are made from abandoned automobile axles, turned to the required size and shape. The bearings are all of babbitt metal set into the wooden rails, and the collars on the shafts are also of babbitt. The machines are finished with a coat of oil shellac over one of black wagon paint.

PLATE A.



Making Babbitt Bearings.

Although the problem of setting babbitt bearings in wooden rails may be new to some, the process is so simple that no difficulty should be experienced in carrying out these suggestions successfully the first attempt.

At the required point in the top edges of the rails saw square notches about an inch wider and half an inch deeper than the diameter of the shaft. With a quarter inch bit bore two or more holes, at different angles, into the bottom and sides of these notches. These are the "anchor holes" into which the melted babbitt metal runs (when the bearings are poured) forming prongs integral with the metal in the bearings, thus serving to hold the latter firmly in place when the machine is in use.

Instead of sawing these square notches the pieces of wood used as caps for the bearings may be fastened firmly in place with lag screws, as when the machine is finished, and holes the proper diameter bored with an expansive bit.

Bearings should be at least half an inch in thickness, and three-quarters of an inch is even better for use in wooden rails.

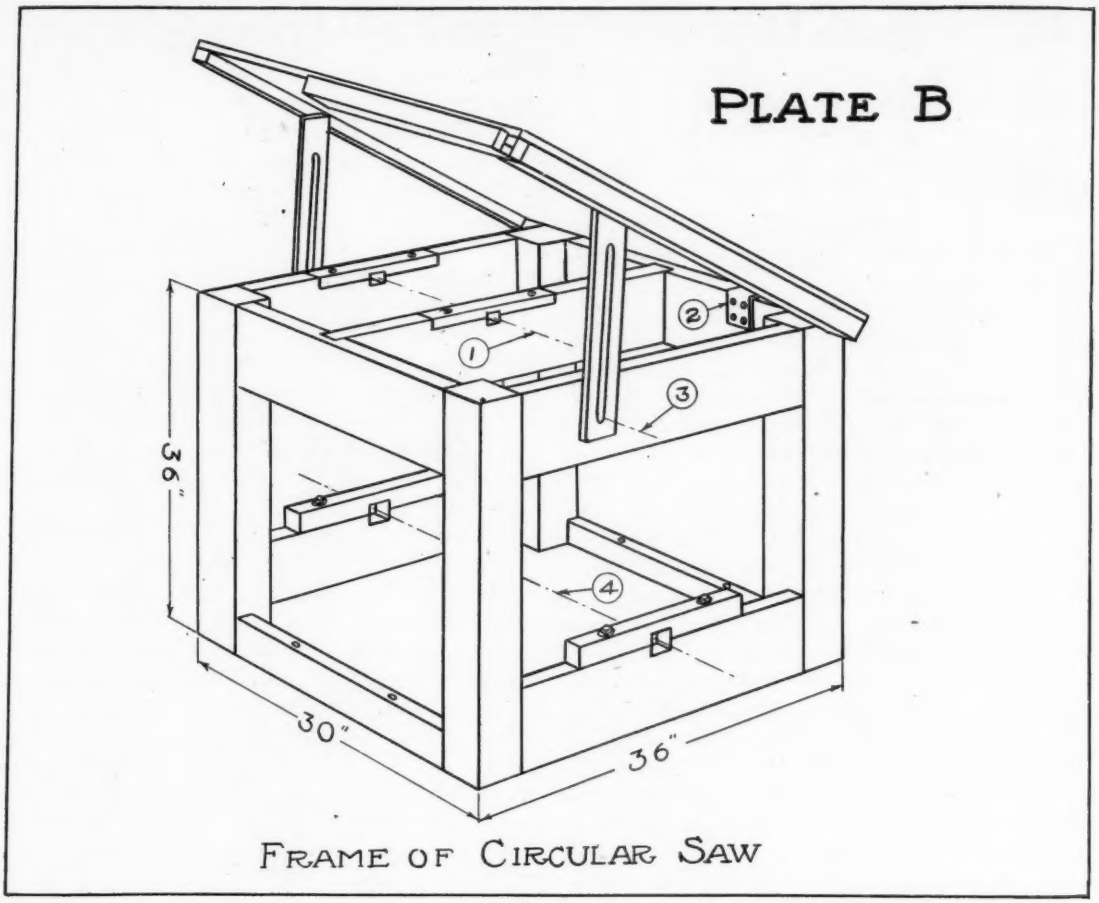


PLATE B. FRAME OF CIRCULAR SAW.

Plugging up the ends of these notches in the rails, and at the same time holding the shaft in the position it must occupy in the machine, is done by slipping a washer of heavy cardboard (with a hole the exact diameter of the shaft), on to the shaft on each side of each rail. Reinforce these washers with thin wooden pieces bradded and clamped tightly to the rails. Plate A.

Babbitt cannot be poured into the wood at as high a temperature as it can into iron boxes, because the wood will char and be ruined; therefore wait until it turns to a bright silver color before filling the spaces around the shaft level with the tops of the rails.

Wait until the babbitt has hardened, remove strips of wood and cardboard washers from the ends of the bearings, lift the shaft out and smooth the metal down level with the top edges of the rails.

The top part of the bearings are cast in much the same manner. Bolt the caps in their places with two or three thicknesses of cardboard between them and the rails, and covering the bearings in the latter. Plug up the ends with cardboard washers and wooden blocks as described above, and pour the babbitt into the mold thus formed through a hole in the top of the cap.

The bearings are next scraped level; oil channels cut; and oil holes drilled through the metal stems formed by the babbit hardening in the pour holes.

Making Babbitt Collars.

Collars to prevent shafts slipping endwise are made by pouring babbitt into molds on the shaft. To construct the molds bore holes in soft wood blocks as deep as the collars are to be thick, and an eighth of an inch wider than the finished diameter. Bore another hole with the same center, using a bit the exact diameter of the shaft. Place the blocks on the shaft, with the holes of larger diameter adjacent to the sides of the rails, and clamp tightly to the latter, with heavy cardboard washers between them and the blocks of wood. Bore a quarter-inch "pour hole" in the top of each block, and smaller air vents near it, then fill the mold with babbitt in the usual manner. (See Plate A.)

Split the blocks from collars, place shaft back in lathe, and turn them down smooth and square. The ends of the shaft can be fitted into wooden chucks and the babbitt turned down with an ordinary chisel on a wood lathe, if no engine lathe is available. Babbitt cuts quite easily with a turning chisel and does not nick its edge or draw the temper.

Collars are "anchored" by filling shallow "V" grooves in that part of the shaft which they are to cover. (Plate A-12.)

Names of Parts.

Plate A.

1. Cap.
2. Cardboard washers.
3. Wooden reenforcement to washers.
4. Shaft.
5. Pour hole.
6. Rail.
7. Oil cup.
8. Oil hole.
9. Air vent.
10. Pour hole to collar mold.
11. Shaft.
12. Collar anchor notches.
13. Collar mold.
14. Cardboard washer.
15. Rail.
16. Babbitt bearings.
17. Cap.

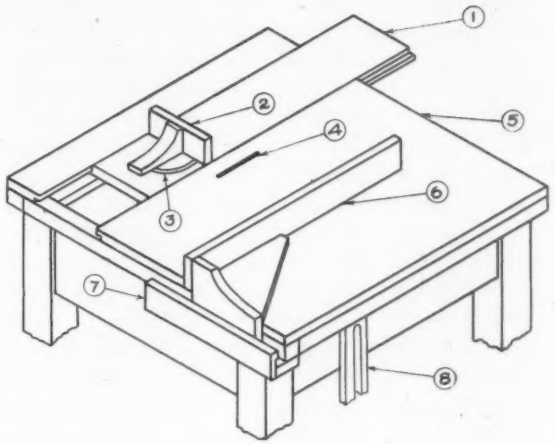


PLATE D.

THE CIRCULAR SAW.

A home made circular shaw can be utilized for much of the lighter work of the manual training department, supplementing the heavier machines, or, where funds are limited, taking the place (at least temporarily), of the factory-built saws.

It would also prove a profitable investment as an individual machine in the planing mill or cabinet shop for all sorts of light work. Such a machine placed near each workman's bench would save a great deal of time usually spent in walking to-and-fro between the bench and large saws, and eliminate the time wasted waiting for a chance to use the latter.

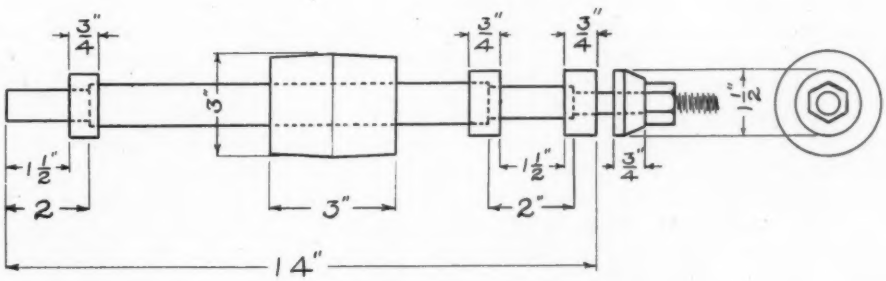
It would be quite as simple to build a saw to perform the heavier work of the shop, if such was desired.

Explanations of the operation of the saw is considered unnecessary, as it is practically identical with that of other circular saws, and it is thought that the drawings of the saw together with the details of construction given in the first part of this article illustrate the manner of construction quite clearly.

To obtain the best results a circular saw should have a rim speed of approximately nine thousand feet per minute. This necessitates a speed of 6,800 revolutions per minute with the five inch saws such as the machine in this school is equipped with. The diameter of the pulley on the saw arbor is limited to two and

PLATE C

SAW ARBOR



COUNTER SHAFT

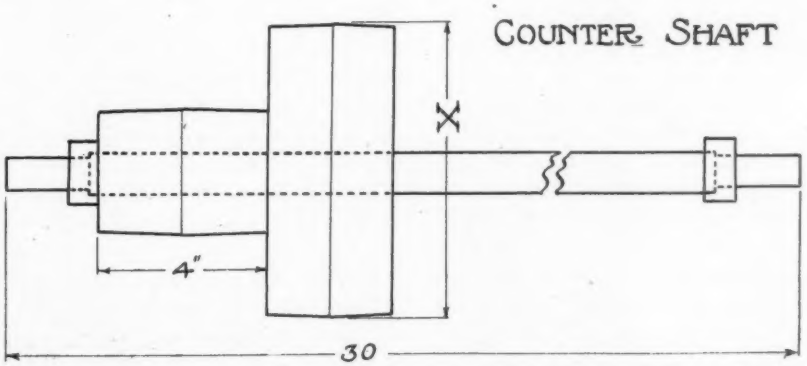


PLATE C. SAW ARBOR AND COUNTER SHAFT.

one-half inches by the necessity of keeping the belt running over it below the surface of the saw table. A larger pulley would, of course, increase the power available but would have to either project through the table, thus interfering with the use of its entire surface, or it would be necessary to set the rails carrying the arbor bearing lower in the frame. This would require the use of larger saws (which could hardly be made from the materials used), or a reduction in the thickness of the stock possible to cut. The size of the drive pulley on the counter shaft (X, Plate C), is determined by the speed of the motor, size of its pulleys, etc., and can easily be worked out by prospective builders of saws to meet the conditions found in their own shops.

Names and Parts of Circular Saw.

Plate B.

1. Center of saw arbor.
2. Hinges.
3. Center of tightening bolt.
4. Center of counter shaft.

Plate D.

1. Sliding table.
2. Cut-off gauge.
3. Angle gauge.
4. Saw throat.
5. Saw table.
6. Ripping fence.
7. Ripping fence guide.
8. Table elevator arm.

Materials for Building Circular Saw.

4 pieces 4x4x36 pine—16 feet BM @ $100.00	$1.60
5 pieces 1½x8x33 pine—20 feet BM @ $75.00	1.50
2 pieces 1½x8x27 pine—14 feet BM @ $75.00	1.05
2 pieces 1½x4x27 pine— 7 feet BM @ $75.00	.53
2 pieces 1½x2x16 pine—½ foot BM @ $75.00	.04
1 piece 1x34x36 pine— 9 feet BM @ $75.00	.67
2 pieces 1x4x24 oak—1⅓ feet BM @ $250.00 2 pieces 1x2x36 oak—1 foot BM @ $250.00 2 pieces 1x1x18 oak— ⅓ foot BM @ $250.00 1 piece 1x2x18 oak— ⅔ foot BM @ $250.00	.83
4 lag screws ¼″x3″	.08
4 lag screws ⅜″x6″	.10
4 R. H. screws 3″	.05
1 pair heavy hinges	.50
1 pair light hinges	.25
1 dozen RH screws 2½″	.15
1 saw arbor turned to details shown in Plate C at local garage	2.00
1 counter shaft turned to details shown in Plate C	2.00
3 pounds babbitt metal	1.50
Total cost of circular saw	$12.85

The Possibilities of Gesso for the Beginner

Ruth Elizabeth Chamberlin

GESSO work is modeling in low relief with a brush, the medium that is used being in liquid form. The method is not difficult and the expense depends upon the ambition of the worker.

Wood is the usual foundation, and boxes and other novelties manufactured for burnt woodwork are excellent and inexpensive. Frames, such as are used for carved gilded frames, are also good, but less expensive than these are the frames often found in the ten-cent stores. At home, one often finds odd boxes, or wooden containers, that can be pressed into service very successfully.

When you have decided upon the object that you wish to gesso, the next step is of course the design. For gesso, a fairly fine design is best, especially for a beginner.

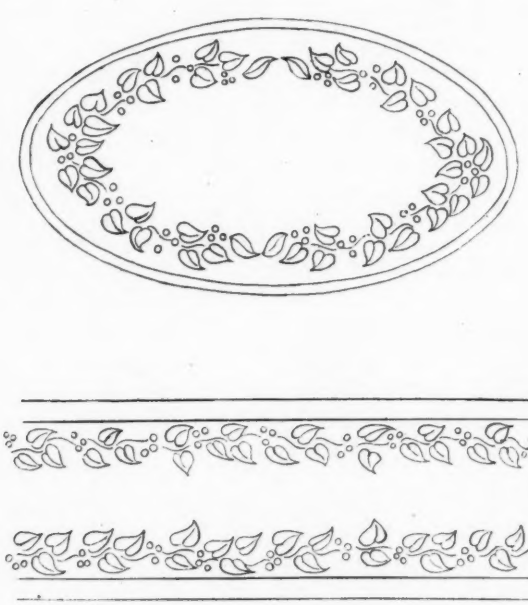


FIG. 1.

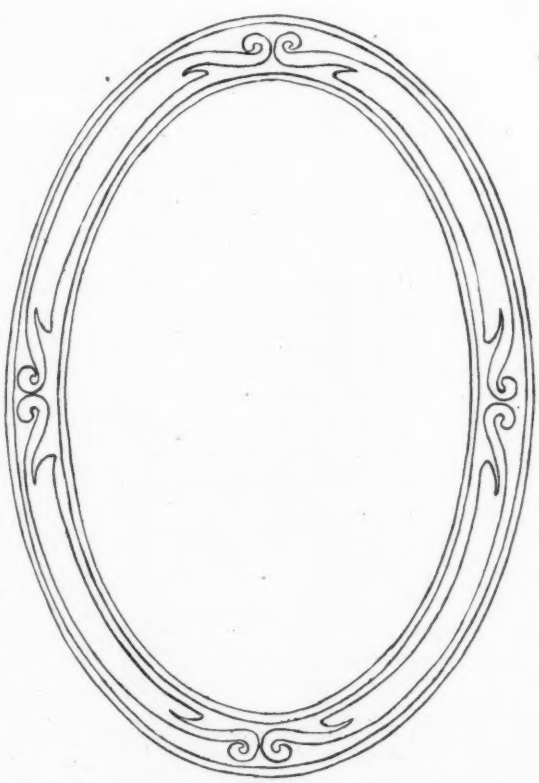


FIG. 3.

FIG. 2

For this kind of work, avoid excessive use of carbon paper. Tracing paper with the opposite side lined in with pencil, is much more successful. If the wood is stained black or a dark shade, the transferring is an easy matter if you chalk the back of your design instead of lining it in with pencil. To keep the design from rubbing, very carefully go over the lines with Chinese white watercolor paints. This holds the design and does not affect the medium.

The medium to be used is made in the following proportion. One part powdered resin, four parts linseed oil, and six parts glue. Sheet glue is the best to use, but it must be soaked in water over night, drained, and melted over hot water, before being added to the mixture. Mix the resin, glue and linseed oil. Next, mix some bolted whiting with some cold water and let it settle. Turn off the water and add the whiting to the first mixture. The amount of whiting added, should be enough to make a medium thick paste. Cook this mixture over hot water, double boiler style, until it is like custard. When using this medium, keep it over hot water so as to keep it in better working condition. When it becomes cool it thickens and does not flow from the brush easily. A small amount is better for the individual worker, and the following rule makes one jelly glass full. Four teaspoonsful of linseed oil, six of glue, and one of resin. Proceed in the same way as for the large amount.

The modeling is done with a camel's hair brush. As gesso should be textureless when finished, try to keep it so as you go along. Do not be impatient and try to put too much on at once. It is a temptation you will find, but refrain, for it makes the work granular and shows brush marks which is just what you don't want. "Blob" on the mixture and leave it. If you find when it is dry, that it is not high enough, just repeat. If any bubbles appear, which they often do, prick them with a pin and they will disappear. Sometimes the work is nearly dry before they show up, and if they do not fill up after they are pricked, drop a little of the mixture into the hole from the point of the brush. Don't be afraid of this work, for if it does not go on well, simply rub it off and begin all over again. The wooden foundation is strong enough to warrant this. Even after it has hardened it is not hopeless, for you can sandpaper the modeling down to the design.

After the modeling is thoroughly dry you can paint over it. If the box is stained dark, gilding the design is often effective, especially if it is toned to harmonize with the wood. In gilding, use that which is mixed with banana oil. The kind that has to be heated melts the medium used and you lose your modeling.

Oil paints are used for coloring in the design. Mix the color so that it will flow on easily, keeping the work flat. The depressions will form interesting shadows, and high lights may be made by wiping with a soft cloth. Don't fuss too much with your paint for it will often settle with more pleasing effects if left alone.

Number one is a design for an oval box which was stained, and the design gilded and toned to harmonize with the box.

Number two is another box which was stained black. The motives on the sides and top were done in soft green, while the dragon was in a soft gold.

Number three is a design for a picture frame which at a distance, resembles the carved gilded frames.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

WHAT VOCATIONAL TRAINING MAY MEAN.

One of the most wholesome symptoms noted in the American schools of today is the constant progress being made in vocational training. Everywhere there is manifested an increased interest and activity in preparing the youth for the more practical concerns of life.

While it is conceded that more vocations make for less enforced vacation there is a larger aspect to this tendency which deserves the attention of all thoughtful men. Much is being said these days about the re-alignment in world markets and the part the United States will play in the international trade relations of the future.

Those who are familiar with America's participation in the world trade of the past know that its raw materials have constituted the bulk of its exports. These materials, with the exception of food products, were exported to Europe, manufactured there into the finished article and in considerable part bought back by the American people. The increment of labor remained in Europe.

The country's exports on manufactured articles, involving a high order of mechanical skill, and the element of science, have always been at a minimum. But, the balance of trade was yearly in our favor, and therefore we were satisfied.

With the new order of things brought about by the world war the United States must strengthen its production efficiency. The countries of Europe, exhausted by the ravages of the war, will recoup themselves by producing more skillfully, more economically and more expeditiously than they ever have before. They are primarily industrial, buying their raw materials from all parts of the world, preparing them for ultimate use, and selling the finished product to the four ends of the world. They will require our raw materials, and it will require no salesmanship to sell them.

But, the products of the American factory, as well as the products of farm and forest and mine, must have an outlet beyond domestic demands. The output going into export may, under normal conditions, constitute the margin between prosperity and depression.

All this means that the American manufacturer must compete with the most energetic producers of the world. It means that the highest order of mechanical skill must find its way into our workshops, and that inventive genius, the economies of quantity production, and marketing ability must come into active and forceful play.

The trained mechanic will become the most important factor in the new order of competitive production. The American manufacturer has realized that the young man who has gone through a trade or vocational school comes to him equipped with the right attitude towards his task, with an appreciation of the dignity which attends a skilful, industrial and efficient mechanic, and with an ambition to render a square day's work for a fair day's pay.

The tendency, therefore, in the schools of the country to emphasize mechanical skill and excellence is a laudable one and will demonstrate its value and utility when the competitive phases of a world market come into clearer relief. The mission of the schools must be to teach the youth how to live, but also how to earn a living. If the American people are to be profitably employed and to remain uniformly prosperous, the increment of labor, on all articles that can advantageously be produced here, must remain within their keeping.

The schools may well shape their activities in order to promote and protect American industry in its efforts to hold its place in the markets of the world, and thus protect the wellbeing of an entire people.

SERVICE AND REWARD.

Now is the time of all times to press the supreme importance and value of *service*. We are passing through trying times. The principles of merit and service as against forcible demand are being fought out as never before.

The important lesson to be pressed home is that one's value and one's deserts are conditioned upon the *contribution which one makes in real service*. When one has rendered the real service, it naturally follows that one is entitled to the reward.

The danger and trouble have arisen from the fact that a great many people have been concerned with securing the reward without great attention to the rendering of effective service.

Teachers can wield a great and needed influence by reasoning out with their pupils the interdependence of service and reward. Perhaps no great service could be rendered by teachers just at this time.

DANGERS AHEAD.

The general business depression and unemployment are going to be taken advantage of by the reactionary forces in education to ask for a return to the good old times of the three R's. To be sure the argument will not be made outright against vocational education and industrial arts work, but the cry of economy, high taxes, and unemployment will be raised to close every school shop possible. There are those who have maintained an attitude of sufferance and tolerance toward these now forms of education. These forms of work have established for themselves a rightful place in the curriculum of our public schools. Hence, the only way that they can be attacked with any sort of success is by the indirect method of retrenchment.

If retrenchment must come let it come to all alike. Let it not pick out as its target the industrial phases of education. These phases are vital, the need for them is very great, and the vocational aspects of the work cannot be delayed. The boys and girls in need of vocational education cannot wait for readjustments and recovery from depression. *They must have their assistance now or it will come too late.*

There are numerous activities that have found their way into the schools that are in no way comparable in value and in pressing need to the activities in industrial and vocational education.

Let every friend of vocational education, industrial arts and continuation or part-time work be found constantly and with one accord opposing those reactionary forces that would eliminate these lines of work on the spacious and false plea of economy.

ALTERATION AND REVISION.

The new year is just opening. Teachers are faced with the necessity of preparing new outlines, problems, etc., or of using the old ones again. This is a serious matter. A good many teachers are content to use the same material, methods, outlines, etc., from year to year with no appreciable change.

We do not see how progress can be made in this way. Old plans, like old clothes, need frequent renovation and patching. In due time they need to be discarded, thrown away, and replaced by new articles better adapted to the needs and purposes of the times.

There is no more encouraging sign than the revising of courses, outlines, etc., and the teacher who is frequently engaged in such revision and remodeling has all the presumption in his favor of being an up-to-date, efficient teacher.

Everything now points to changes. New needs have arisen, new points of view have been acquired, and new demands have been made by the market conditions and the general financial situation.

Now is a good time to revise, to eliminate the worn out and useless, and to plan a more effective and less wasteful program.

THE MEASURE OF TEACHER

It seems absolutely necessary for teachers constantly to remind themselves that the most important thing in all the world, so far as the schools are concerned, is the matter of highly superior instruction.

What the teacher knows, or what the teacher is able to do, or what theories of education the teacher holds, all amount to very little, unless the teacher is really able to *put across* the knowledge, the ability, and the theories to the classes which are being taught. What takes place in the mind and life of the individual pupil as the result of instruction is the measure of a teacher's skill and worth.

IS TEACHING NARROW?

I heard a superintendent of schools say not long ago that teachers are narrow. This is a statement that I cannot force myself to accept. On the contrary, I believe teachers are broader-minded and more universal in their thinking and knowledge than are any other class. Comparisons are unpopular, I know, but are nevertheless necessary. Let us consider lawyers. Their training in all subjects except their major is decidedly elementary; of the law they know court procedure and where information wanted may be found. They read the daily papers, and profess a rather intense interest in practical politics. How is it with the bankers? They have picked up some knowledge of finance from their apprenticeship, can read an ordinary financial statement, and understand what constitutes simple credits. Their learning is neither profound, nor comprehensive; and their business judgment is not always infallible. To get an intelligent and interesting conversation out of the usual type you must talk about his own specialty, or perhaps a timid venture into the fields of sport or party politics is admissible.

Thus with other trades and professions. But note that all topics and all interests cluster around his business, and the sports in which he is proficient. He feels no compunction about talking shop, for shop is practically all he knows.

Now a teacher is first required to give proof of both general and special training, and further to back that up by satisfactory performance. She teaches not one thing but many; she uses knowledge drawn from all sources. She probably knows more about practical farming than the farmer, and could match the physician pretty well in the field of sanitary engineering. Then she knows human life and human living. The purpose of her work is not to advance her own interests, but to help others—individually and collectively. There is more variety in her duties than is found in selling groceries or computing interest. The teacher is not narrow, nor is teaching a narrow profession. Outsiders do not commonly regard the profession as narrow; most of the criticisms come from teachers themselves. The degree of perfection expected by these does themselves, and all, credit for modesty, but is there not a limit to which even this can be justified? A little more respect for ourselves will not do any harm. If there is any truth at all in the new psychology, the narrowest persons on earth are those who think themselves so.—*John C. Almack.*

Labor needs a few headaches to understand capital, and capital a few backaches to understand labor, while reform needs to get its hair cut to understand either.—*Irving T. Bush.*

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

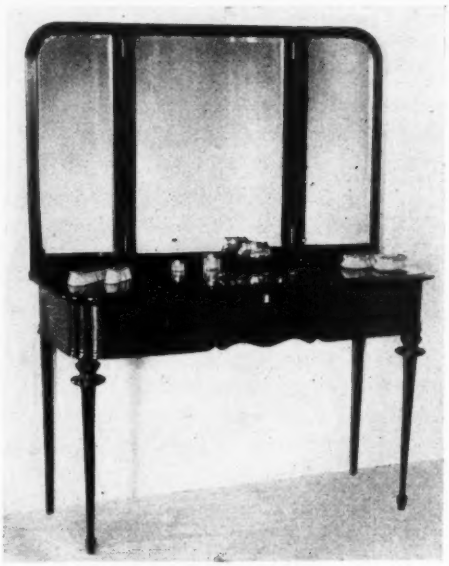
Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

DRESSING TABLE.

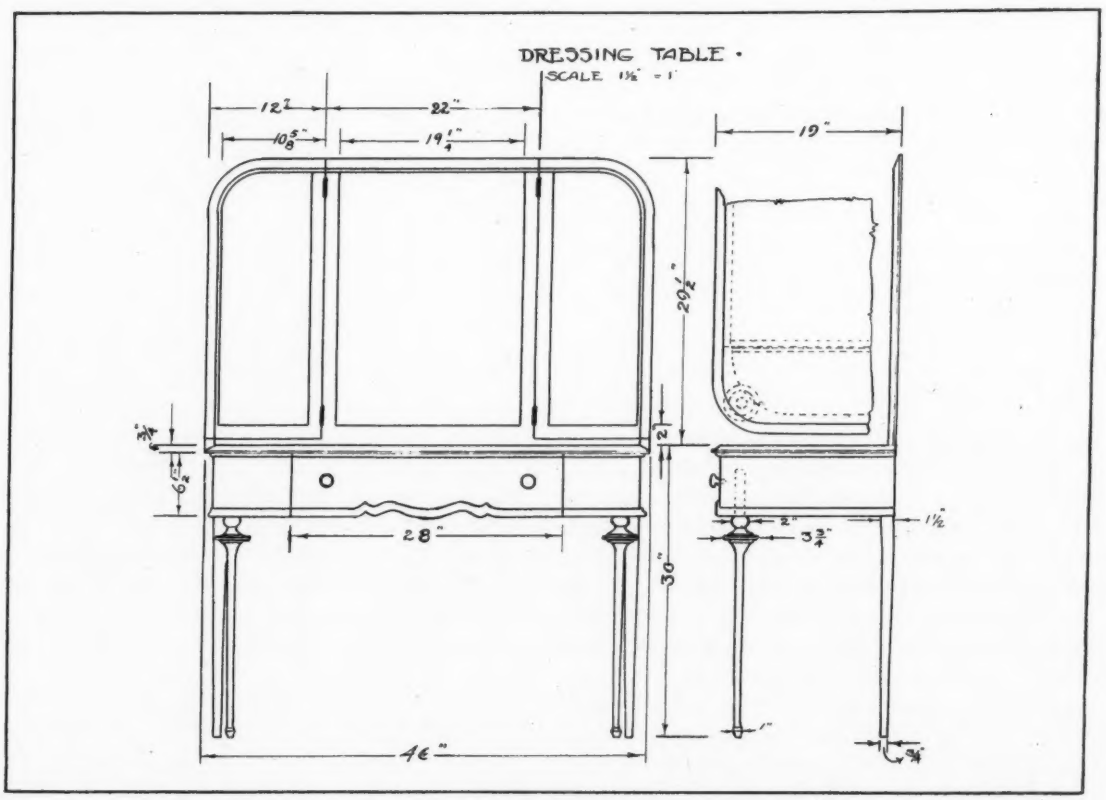
Howard R. Porter, Ellensburg, Wash.

The accompanying photograph pictures a toilet table, interesting not from any particular feature of design but from the fact that it was made out of an old piano. The piano involved was an old square concert grand whose "insides" had been damaged beyond repair. It had stood in disuse for several years and when even the junk man had refused to give ten dollars for it, it was turned over to the manual training department to salvage what was possible out of the wreck.

The ivory and ebony keys have proved very acceptable as inlay material while the wires, screws, brass pins, etc., have served a multitude of purposes. The most interesting possibility however was discovered when the solid body or bed was cut in two. The end with its two round corners suggested material for a writing desk or toilet table, and when cut in half proved to have the correct dimensions as far as width or depth was concerned. These two "ready made" ends were then properly spaced with side rails and the body of the table was formed. The flat round cornered top proved the right material for the top of the table and its shaped edge gave a factory finished effect. Then the shaped moulding was stripped from various parts of the piano and reglued around the upper



DRESSING TABLE.



DETAILS OF DRESSING TABLE.

and lower edges of the table, the curved segments just fitting the round corners, with a specially shaped piece serving to enhance the lower edge of the drawer front.

Perhaps the most satisfactory adaptation in the whole piece was that of making the mirror frames from portions of the piano top. The curved corners were simply cut out to form the swinging mirror frames, thus allowing the shaped edge to run around the entire set of mirrors. The material removed from the center of the side mirror frames was not wasted but worked up nicely into picture molding. The center frame was made of strips cut from other parts of the piano top.

The only parts of the table that the piano did not supply were the legs and these were made of walnut, finished to match the other material which was rosewood. The entire piece, after the old varnish was removed, was left the natural rosewood color, and French polished.

While not everyone will have an old piano available for transmuting into a toilet table, the design is not difficult and could be reproduced in the average shop, the rounded corners presenting the chief problem. These can be easily built up, bandsawn and veneered.

NECKTIE HOLDER.

A. R. Mitchell, Madison, Wis.

No doubt, the average teacher of manual training, has been confronted with the problem of providing a project for upper grade classes which involves extremely accurate workmanship and very little material. This latter feature is surely one to be reckoned with, during these days of high prices.

This necktie holder is one which the writer has found to be a great favorite with eighth grade boys, since it is something that they can use, and is both ornamental and practical. The making of the working drawing provides a very good problem, particularly for projection work.

The top frieze can be attached to the back with either 1″ brads or oval-head screws, while the two end pieces can be attached by means of either ¾″ brads, oval head screws, or flat head screws, inserted from the back. The holder may be hung in several different ways—small holes may be bored through the overhang of the top frieze and ribbon or cord inserted, or small strips, with holes for ribbon, may be fastened on the back side of the back piece. Screw eyes may also be used.

Bill of Material.

1 piece ½″x4¾″x16″—back.
2 pieces ½″x1¼″x9″—top frieze.
2 pieces ½″x1⅝″x6″—ends.
1 piece ½″x½″x15″—bar.

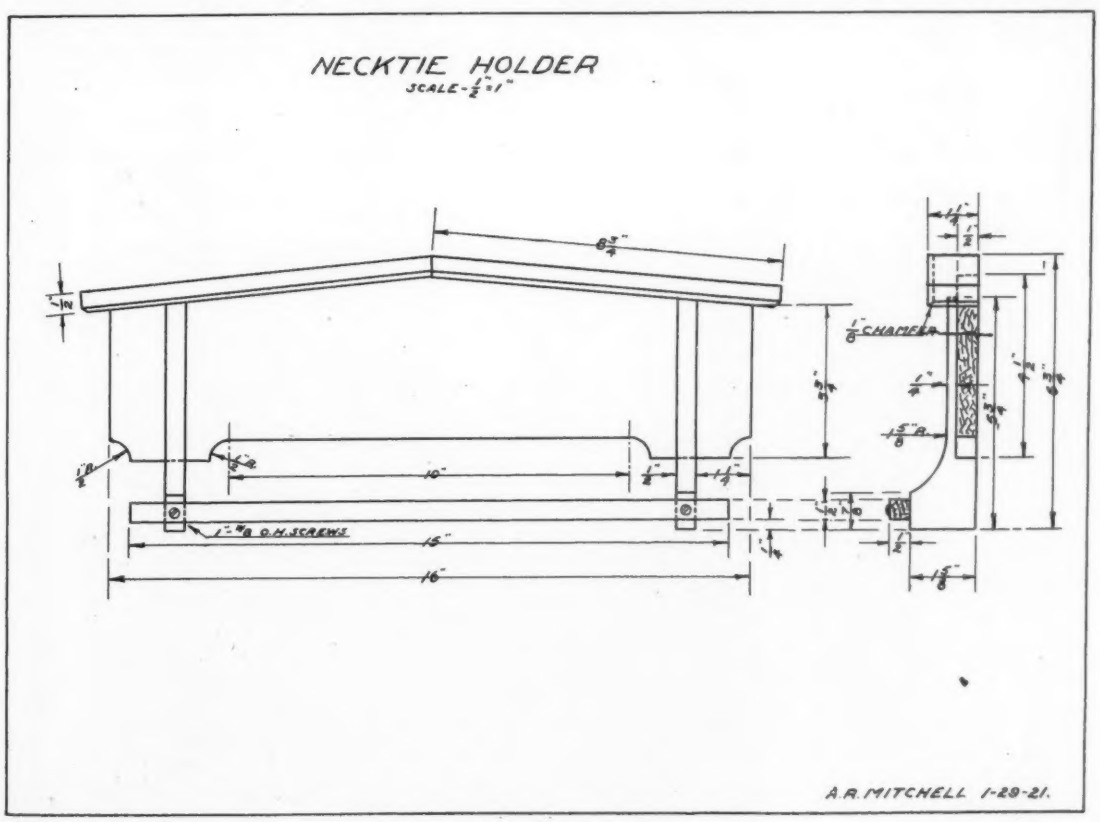
Black walnut, mahogany, gumwood, birch or oak may be used, and finished as desired.

INDOOR TARGET.

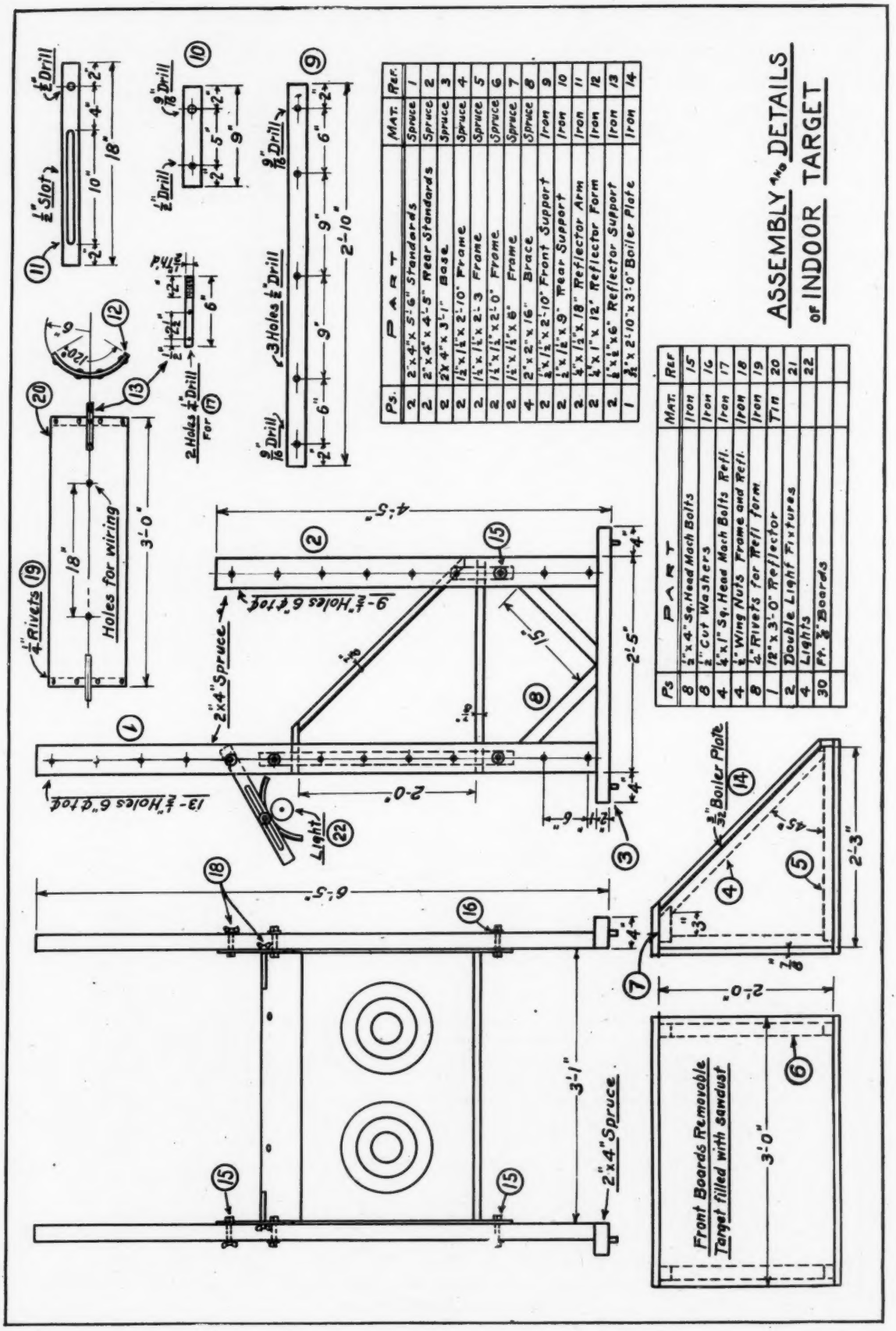
A. B. Hayes, Director of Mechanic Arts, Bangor, Maine.

For a long time officers connected with R. O. T. C. units in the various educational institutions have been hampered for a suitable target range. Very few schools have the room to build a special range, but nearly all of them have a room which could be used for a range part of the time but which would not be suitable for erecting a permanent target. If a target could be made which would be adjustable, and at the same time could be taken down and stored away in some out of the way corner, the problem would be solved.

These conditions existed in the Bangor high school which like every high school in the country can hardly accommodate the various classes, let alone the target work. On his assignment to Bangor Lt. Col. Casper W. Cole started to overcome this handicap and with the assistance



DETAILS OF NECKTIE HOLDER.


ASSEMBLY & DETAILS
OF INDOOR TARGET
PART | MAT. | REF.
2 | 2"x4"x5'-6" Standards | Spruce | 1
2 | 2"x4"x4'-5" Rear Standards | Spruce | 2
2 | 2"x4"x3'-1" Base | Spruce | 3
2 | 1½"x1½"x2'-10" Frame | Spruce | 4
2 | 1½"x1½"x2'-3 Frame | Spruce | 5
2 | 1½"x1½"x2'-0" Frame | Spruce | 6
2 | 1½"x1½"x8" Frame | Spruce | 7
4 | 2"x2"x16" Brace | Spruce | 8
2 | ¼"x1½"x2'-10" Front Support | Iron | 9
2 | ¼"x1½"x9" Rear Support | Iron | 10
2 | ¼"x1½"x18" Reflector Arm | Iron | 11
2 | ¼"x1"x12" Reflector Form | Iron | 12
2 | ¼"x1½"x6" Reflector Support | Iron | 13
1 | ⅛"x2'-10"x3'-0" Boiler Plate | Iron | 14
PS | PART | MAT. | REF
8 | ½"x4" Sq. Head Mach Bolts | Iron | 15
8 | ½" Cut Washers | Iron | 16
4 | ¼"x1" Sq. Head Mach Bolts Refl. | Iron | 17
4 | ½" Wing Nuts Frame and Refl. | Iron | 18
8 | ¼" Rivets for Refl Form | Iron | 19
1 | 12"x3'-0" Reflector | Tin | 20
2 | Double Light Fixtures | | 21
4 | Lights | | 22
30 | Ft. of Boards
Front Boards Removable
Target filled with sawdust
3'-0"
2'-0"
2'-3"
3'-1"
2'-5"
4'-5"
6'-5"
2-0"
2"x4" Spruce
3/32" Boiler Plate
45°
120°
Holes for wiring
18"
3'-0"
¼" Rivets
Light
13-¼" Holes 6" o'c
9-¼" Holes 6" o'c
3 Holes ¼" Drill
2 Holes ¼" Drill For (11)
¼" Drill
⅛" Drill
¼" Slot

of the mechanic-arts department has developed a target which should be adaptable for any indoor range.

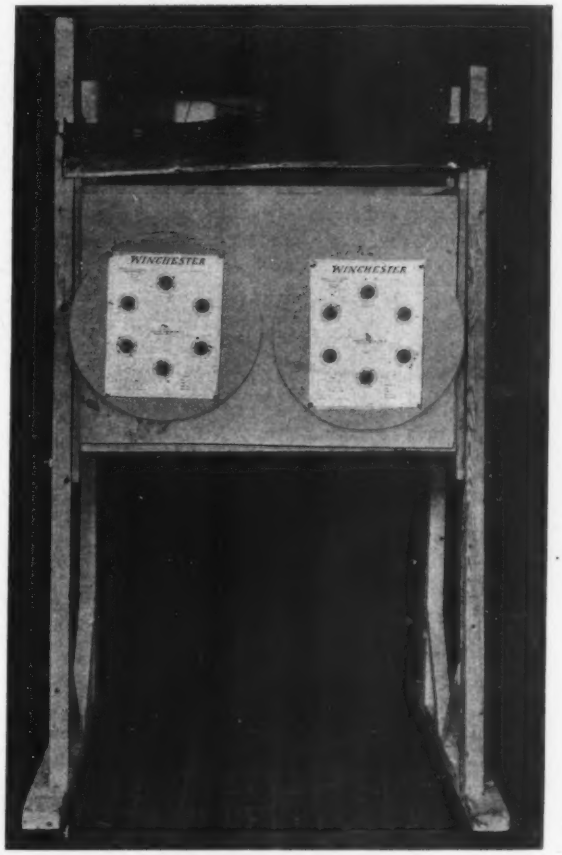
The target proper consists of a box made of spruce boards over a 1½″x1½″ frame. The back of this box is set at an angle of 45°, and lined with a piece of 3/32″ boiler plate to stop any bullets which might go through to the back. The boards on the front of the box are screwed on and are replaced when they become too badly shot to pieces. The box is filled with sawdust and shavings to stop the bullets.

The target is mounted on frame supports which bolt to standards. These supports are made of ½″x1½″ iron and are screwed to the target. The standards are of 2″x4″ spruce with 9/16″ holes bored every 6″ so that the target may be adjusted to any possible shooting position. The standards are also equipped with casters so that the target may be moved around.

The light is provided by four incandescent lamps with a tin reflector. This reflector is equipped with arms which fasten to the standards and which reflect the light as may be desired.

The target was made by mechanic-arts department in the high school and has been in use since early in December, 1920. It has proven to be a wonderful arrangement and the men are enthusiastic in their praise.

Schools which are pressed for room will be particularly interested in this new target as it can be set up anywhere. All that is needed is the required 50 ft. or 75 ft. from the marksman to the target. Plans and specifications have gone on to the War Department.



THE TARGET READY FOR USE.

SCRAP BOXES FOR WOOD.

William V. Winslow.

Crowded conditions and poor lighting which are so often met with make the boxes illustrated especially serviceable, for in addition to their use for storing odd pieces of wood they can be arranged to support boards and in this way serve as a table upon which to stain, to assemble parts, do concrete or other industrial arts work. A permanent top can be constructed and when not in use can be put against the wall out of the way. Of course the boxes can be used singly in which case separate tops must be supplied.

At the North Tonawanda high school we use the larger box in the bench work shop and the smaller one in the machine woodworking room.

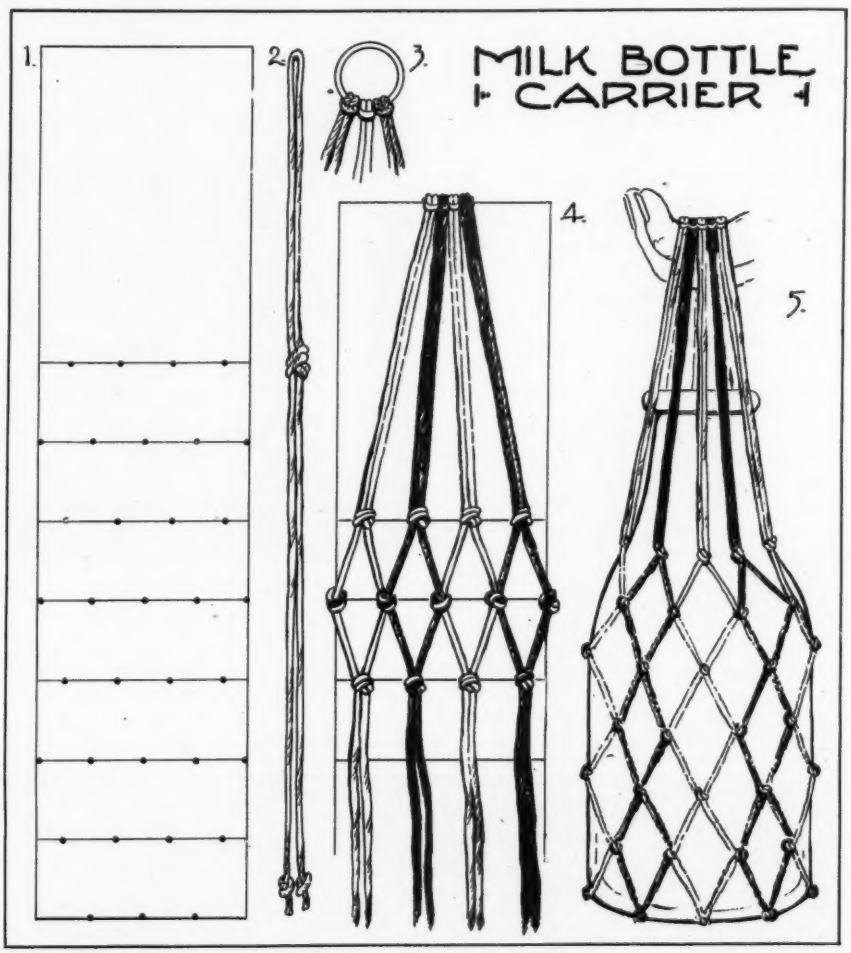
The smaller box is placed just to the right of the circular saw where it does not interfere with the tilting of the saw table. As shown in the illustration it furnishes a support for the fence or the gauge from the table when these are not in use.

SCRAP BOXES MADE AT THE NORTH TONAWANDA HIGH SCHOOL.

A MILK BOTTLE CARRIER.

C. Edward Newell, Springfield, Mass.

Out of the slogan "be patriotic, carry your own packages" has grown the very universal custom of carrying many articles formerly delivered free of charge. One of the most awkward of these packages is the milk bottle. Especially is it at the peril of its existence it entrusted to a small child and when it is the one last package added to the already too numerous load carried by an adult. The macrame bag or milk bottle carrier will save many a crash and is so compact that when not in use it can be carried in a coat pocket or purse.



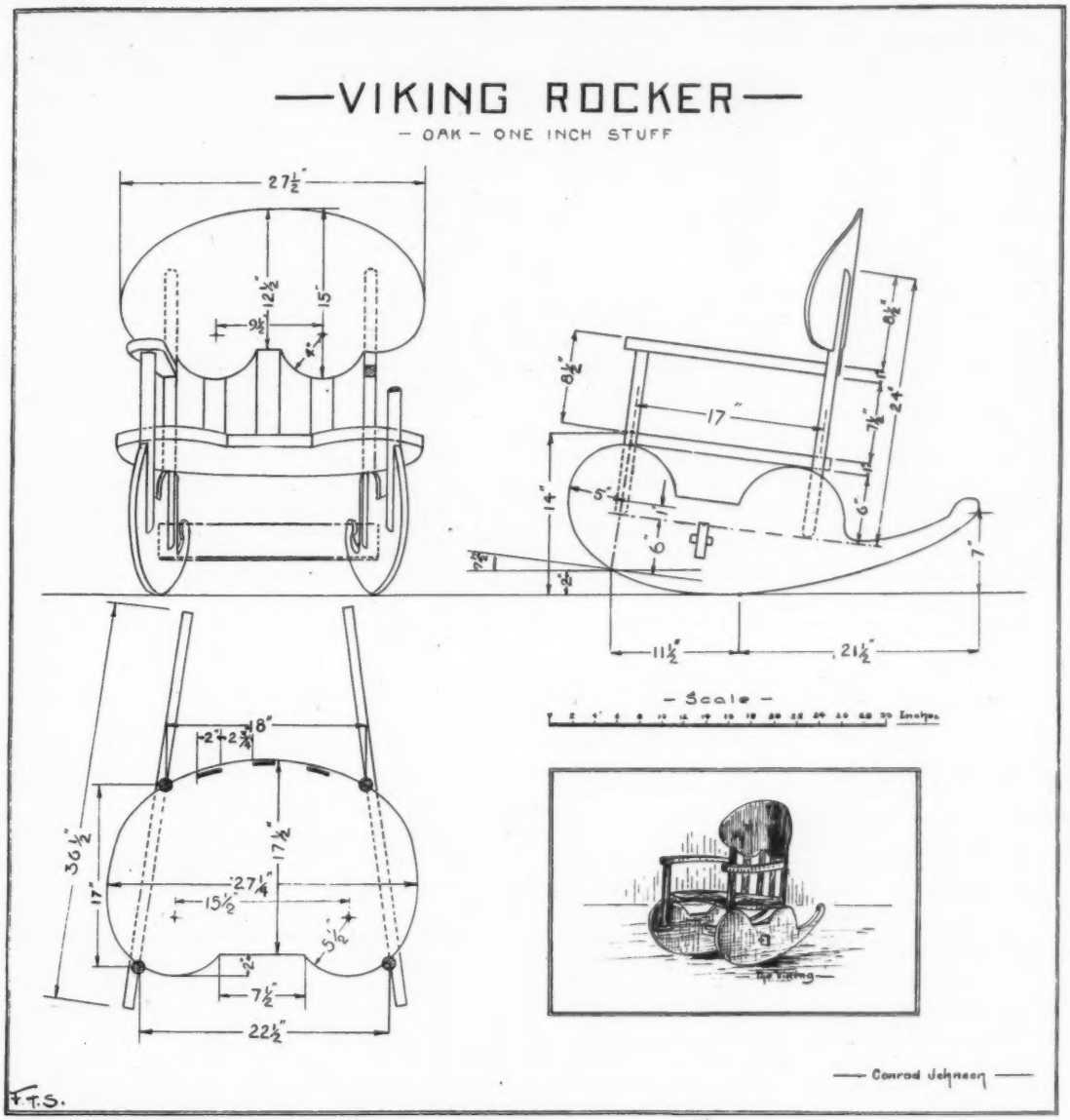
DETAILS OF LOOM AND MILK CARRIER.

The materials needed for the bag are: one piece of pulpboard 4″x16½″; one ½″ or ⅜″ brass drapery ring; one ounce of macrame cord of a light color; one ounce of a dark color; two feet of common white string.

Any medium weight cardboard from a discarded suit box will answer if the pulpboard is not available. Pulpboard can be purchased at the bookbinders and at paper houses in sheets some 2′x3″ in size and in bundles of 50 sheets. The drapery rings may be purchased by the dozen in the drapery department of a dry goods store or at a ten cent store. The macrame cord is a standard weaving material carried by school supply and paper houses. The size 12 cord comes in a variety of colors having about a half-pound in a ball. Two colors should be selected or light and dark values of one color. Four pounds, two of each will supply a class of 45 pupils.

The Loom: On the 4″x16½″ pulpboard draw one 4″ line 6″ from and parallel to one 4″ end. Between this line and the opposite end of the card draw six 4″ lines 1½″ apart. Repeat all lines on the opposite side of the card. On the first 4″ line, the one 6″ from the end of the card, place points ½″ from the ends of the line. Between these points place two points 1″ apart. Punch holes through the card at these four points. On the second line place three points 1″ apart, also points at the ends of the line. Place points on the third line, fifth line, seventh line, like the first line points. Place points on the fourth and sixth lines and the lower edge of the card like the second line points, Fig. 1. Repeat all points on the opposite side of the loom. Accent all points with brilliant crayon or color spots.

Prepare Macrame Cord: Measure and cut four 6″ pieces of white string. Measure and cut four 1½ yard pieces of macrame cord of dark color. Measure and cut the same amount of light color macrame. Tie hard knots close to the ends of each cord as fast as cut to prevent raveling. Double each cord, tie hard knots 6″ from loops, Fig. 2. Hook the cords over ½″ drapery ring, alternating colors, Fig. 3. Place the ring over the end of the card or loom, four double cords of each color on each side of the card. Fasten the cords to the card by means of the 6″ white strings, looped and tied through the holes in the first line. A dark macrame knot will be on one side of



DETALS OF VIKING ROCKER.

the card, tied by means of the white string through one hole, to a light macrame knot on the opposite side of the card and so on alternating the colors on opposite sides of the card.

Weave the Bag: The card with the lines drawn on it makes a loom upon which to weave, by knotting or tying the bag. Begin to tie the knots at the second line using a light and a dark cord; the crayon accented points serve as guides for knots. Tie a single hard knot at each point. Work completely around the loom. At the line end, one cord from each side of the loom will be knotted, Fig. 4. At the third, fifth and seventh lines tie cords of the same color. At the fourth, and the sixth lines and at the lower edge of the loom tie cords of two colors, or light and dark cords. Cut a 16″ piece of macrame to run through the last row of meshes, above the last row of knots. Run this cord through the meshes twice and securely tie the ends using a square knot. The opening at the bottom of the bag should be about 1½″. Cut off all cords 1½″ below the last row of two color knots. Cut away the white strings and remove the bag from the loom by bending the card and slipping it out of the bag at the top. A milk bottle can be slipped into the bag at any one of the eight openings between the double cords.

Doing It for the Boy.

Some teachers do not allow boys to find out things for themselves. They "skin the banana" mentioned in the following:

A little girl had received a banana from the grocer and had accepted it silently.

"What do you say to the kind man?" asked her mother. "Please skin it" replied the child.

If we want knowledge, we know we must conquer ignorance, so when we want light we conquer darkness, and when we come to want success, we know we have but to conquer a faint heart.—*Lloyd.*

A MECHANIC-ARTS BUILDING.

New Mechanic-Arts Building, South Cache High School, Hyrum, Utah.

E. Perry Van Leuven, Head of Department of Manual Arts.

In the design of a shop building for a rural school many things must be considered. The building must be such as to accommodate courses in manual training demanded by the particular district it is to serve. The type of agriculture the community is engaged in must be met with adequate manual training. The mechanical problems of a dry farm are far different from those of a fruit farm, and the manual training offered to the students should attempt to solve a majority of these problems.

Most rural schools are not large enough to need a separate shop for each branch of mechanics for the entire school year. Many courses can and should be given in each shop room at a different time. Probably the entire course in mechanics will be taught by not more than two or three instructors. These few men will teach at least six or eight different branches of mechanics, hence courses can not run continuously. The entire class must change from one branch to another, all at the same time. It is surely a poor policy to divide a shop building into a number of small shops, each for a specific type of mechanics when that type will only be given a few months at most.

I am of the opinion that the courses should be well outlined so that the building can be planned to accommodate the work desired, and unless the school is a trade school, in which it is known that the different departments of trade training will run continuously, that the shop should have only a few large shops for practice and the necessary tool rooms and store rooms.

One of the points that has come to my notice in shop buildings is a lack of tool rooms, store rooms, etc. The absence of these rooms is a detriment to an efficient shop. Small rooms are far superior to cages and cupboards to house the general equipment of the shop. In a shop where a stock of materials must be carried, store rooms are an absolute necessity. Not only is the appearance of the shop improved but the commercial-shop atmosphere is introduced.

A paint room is a fundamental addition. Paint and varnish jobs must be removed from the shop dust and it is highly desirable that the paint room have an even temperature. In particular is this true in the repainting of an automobile. In the building design the paint room should have north light.

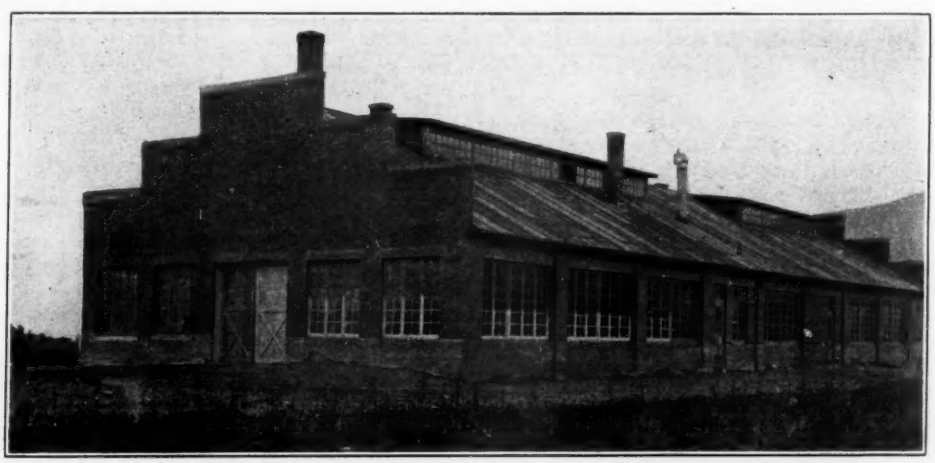
It is my shop experience that a class cannot be kept together in their advancement. It is useless to give a demonstration to a boy until he is ready to do the job. In an average class about three demonstrations are usually necessary to take care of the slow, the medium and the fast students. If this is the case it is impossible to conduct a class recitation in the shop itself. The necessity of a classroom is evident. If a classroom is provided with a demonstration bench, classes can be held for a few students, without taking all from their jobs. I have visited shops where instructors have all boys (no matter at what stage of advancement) stop working, gather around a bench and stand up the entire period, no less than three times, for a demonstration on the same project simply because the class could not be kept together and because a class recitation was impossible with boys working at their bench or machine.

It would undoubtedly be a good policy if the head of the shop department could cooperate with the architect in the design of the shop building, to properly utilize it to its maximum capacity. In this shop building the writer designed and with the aid of Mr. H. R. Adams, principal of the school, supervised the construction of the building, at no time calling for the services of an outside architect. We made our own design, wrote the specifications, got out the working drawings and blue prints, submitted the design to the state architect for approval and finally erected the buildings, letting what sub-contracts we saw fit.

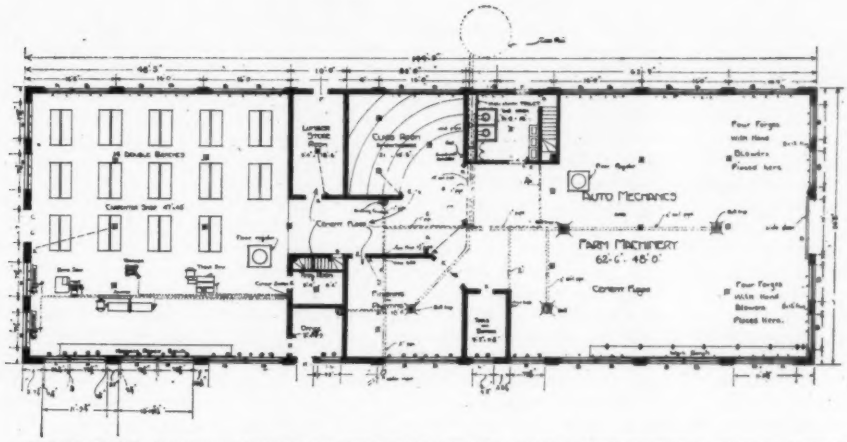
Not only did we save the board of education a considerable sum of money in architects' fees, for drawings and supervision; but the entire construction was thirty per cent below the lowest contractor's estimate. The construction was twenty per cent below the estimate made by the state architect. Wages were high; carpenters received $7 per day, brick layers were paid $10 and $11, tenders $6, plasterers $10, and common labor, $4.50 to $5.

The low cost was due, we believe, to close figuring in the purchase of material, to eliminating waste of time and material, and to favorable purchase and delivery of material. The building was completed sixty days after started, so it is evident that no time was lost during construction.

The illustrations explain the building completely. A few points of interest might be mentioned. The classroom is of amphitheatre type affording good view for all



GENERAL VIEW, MANUAL TRAINING BUILDING, SOUTH CACHE HIGH SCHOOL, HYRUM, UTAH.



FLOOR PLAN, MANUAL TRAINING BUILDING, SOUTH CACHE HIGH SCHOOL, HYRUM, UTAH.

students in class demonstration. This room is provided with an opening from the shop 7′ x 8′ in size, thus permitting the entrance of an entire machine for class study. The paint room on the opposite side of the building has a similar entrance allowing a large car or machine to be brought in for painting, washing or cleaning. These 7 by 8 foot doors are on an angle of 45 degrees permitting the machine to be placed anywhere in the room without backing or shifting.

The outside entrance of the farm machinery shop is ten feet square—large enough to admit a threshing machine for study or repair.

Each main shop has a maximum of light—that is, light from three sides and from the sky-light ventilators. With this construction it is impossible to cast a shadow on any bench or work—a very desirable condition in a shop.

The building is built of brick throughout, unplastered on the inside, except for the office and the ceilings of the classroom, paint room, toilet, and store rooms.

The roof is supported by queen rod trusses, sixteen feet on centers. The purlins, four feet on centers, are hung in stirrups and are flush with the surfaces of the trusses. There are no rafters. The sheathing is nailed directly to the purlins and trusses. The entire room is covered with five-ply tar and felt roofing. The under side of the sheathing is finished by paneling the purlins and trimming with a three inch bed mould. This open roof construction is neat and the expense of a ceiling is eliminated.

Each shop is provided with its own pipeless furnace. These furnaces take care of the heating very efficiently. A fire started one hour before school opens will raise the temperature from thirty degrees to seventy degrees. These two furnaces installed, cost only $600. The estimate for steam heat piped from the main building was $2,200 and I do not believe that the steam heat would be more efficient.

The floor in the carpenter shop and the office is wood, the remainder of the building has concrete floor. The truss roof gives the much desired clear floor space for shop purposes.

Electric wire conduits were placed beneath the floor in the carpenter shop eliminating overhead wiring for each individually driven machine.

Few changes have been made in the floor layout. In the carpenter shop the benches have been moved to the north side and the conduits have been installed on the south side. This was done for two reasons. The benches are used more than the machinery and are moved out of the sunlight. The machinery was moved closer to the lumber store room.

ART APPRECIATION.

Marie Carey Druse.

"The purpose of Art education," says Henry Turner Bailey, "is the development of appreciation for the beautiful and of the power to produce beautiful things." To the average person the first purpose seems the more important because it is something with which he is intimately concerned, whatever his business in life may be.

Art is not a thing, but rather a quality with which things are endowed, and the appreciation of that quality begins as soon as the individual makes a conscious choice between objects because one gives him more pleasure than another. Appreciation and enjoyment go hand in hand, and the problem of raising the standard of appreciation resolves itself into one of raising the standard of enjoyment.

To most of us art means a picture in a frame, a statute on a pedestal, a building whose columns are of Greek origin. We are apt to forget that everything that speaks to us through its color, its form, or its arrangement has or should have the quality of art inherent in itself, whether it be a sunset, a new dress, a page in a book, or the room in which we sleep. It is this wider interpretation of art that makes the development of a national art appreciation a paramount necessity. As a people, we have low standards of enjoyment, and this is reflected in the objects with which we surround ourselves. Manufacturers and merchants tell us that they make and sell goods the public will buy. The buyers say that they must purchase such articles as they find for sale. The remedy lies in the development of new and better standards of taste in the younger generation who in the tomorrows to come will be the manufacturers and merchants as well as the buying public. When they have once learned that any article may not only be useful, but beautiful as well, the supply and demand for such articles will follow.

Our work as teachers is to develop the talent we find in each child who comes under our care to such a degree that he will appreciate and enjoy only those things that are inherently useful and beautiful in his home, in his community and in his country.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Finishing Gum and Cherry.

232. Q:—I have made a caned fernery of two kinds of wood—red gum and cherry. How should I stain it to get a dark brown color and have the two woods look alike? Is it advisable to stain the cane and varnish it, or leave it natural?—S. M. P.

A:—First sponge the wood with a solution of two ounces of tannic acid to a gallon of water. This when dry is to be sanded smooth and followed by a second coat of hot stain made from two ounces of sodium or potassium dischromate per gallon of hot water. The work should then be placed in a warm room in order that the color may fully develop from the atmosphere. The work may then be given a sizing coat of any good varnish and when dry sanded glass smooth. These varnish coats are to be repeated until the proper surface is obtained. Avoid the use of shellac on work of this type owing to the possibility of damage to the finish from moisture. If it is desired to stain the caned panel it is suggested that a coat of Japan gold size be carefully brushed on and allowed to dry. On this surface there may then be built a pleasing shade of color through the use of Japan to match the shade of the fernery. This method is virtually the production of a color glaze and while best done with an air brush, it may however be done quite as well through the use of considerable care and a soft fitch flowing brush which will prevent the lifting of the glazing color. This should be allowed to dry at least twenty-four hours and may then be given one or more coats of the varnish, care being taken to avoid undue brushing which would tend to soften and displace the glazing color on the cane work.—Ralph G. Waring.

Painting Exteriors.

234. Q:—I would like to obtain some information about paints. A house which had been painted a chocolate color has faded considerably in two months. The paint is dull and has no gloss. What will prevent fading and what can be done to obtain a gloss?—W. M. F.

A:—So many factors enter into this case that I am forced to simply enumerate several possibilities and the usual treatment. First, the house may have been in a neglected condition and the paint work practically "starved for oil" as it is termed in the painting trade. It will be readily seen that when a new coat of paint is applied that this porous under surface will very quickly absorb every particle of oil obtainable, thereby leaving the new coat in a dry and chalky condition. Another coat over this foundation will temporarily allay this condition, but it too will soon become dead and lifeless through loss of oil absorbed by the priming coat. This general condition of oil loss is responsible in the main for the socalled fading of brown shades. The loss of oil through absorption is often hastened by the use of too much turpentine in priming and finishing coats.

To inexperienced people a paint mixture having the proper oil body often seems too stiff and heavy for brushing and in order to avoid the elbow grease, which all first class paint work demands, the goods are thinned with turpentine. The only thing which is at all practicable in this case is to repaint one coat made up on the following formula:

100 lbs. white lead in oil,
20 lbs. burnt umber,
8 lbs. burnt sienna,
¼ lb. medium chrome yellow,
6 gals. raw linseed oil,
½ pt. dark japan drier.

This makes about eleven gallons of paint.

I believe it to be good practice to add a pint of spar varnish to each gallon of paint ready for the last coat work. I find this acts as a good re-enforcing vehicle and enables the oil to stand up better and to hold its gloss longer than would otherwise be possible. This, of course, infers the use of a high grade outside spar varnish such as, for example, is made by Pratt and Lambert or Keystone Varnish Company.

For some unknown reason the general opinion seems to prevail that anyone can paint a house. Perhaps anyone can paint a house but that is no guarantee that the surface has been properly prepared for the paint; that the paint itself is the proper mixture for the different sides of the house, since the north will always take more oil than the east, and the south a little stronger color than the west; that the proper kind of brush and sufficient brushing in an approved manner is being used—in other words, that the man on the job knows his business thoroughly. In no trade is experience and long practice quite so necessary as in the painting trade. For the amateur to attempt to do the work of a well trained man is often attended by great risks. For instance, I have heard people insist that any old thing is good enough for the priming coat and that yellow ochre is good enough. The result is that this coarse pigment does not attach itself well and thoroughly to the wood; worst of all, it absorbs moisture from the atmosphere during the process of drying the priming coat, and when covered with high grade finishing coats, never offers a foundation of any merit whatever. Hundreds of jobs where cracking and blistering have occurred in after years, and sometimes immediately after the work is done, can be attributed to this malpractice. It is the best of good economy to hire an experienced journeyman painter who takes pride in his work, and who is willing to offer accepted paint jobs which have stood the test of time, as recommendations.—Ralph G. Waring.

VOCATIONAL CONFERENCE AT STOUT INSTITUTE.

The vocational conference held during the month of August at Menomonie, Wis., aroused considerable interest not only because the program subjects and the speakers were well chosen, but also because both program and speakers revealed surprising strength.

"Educate the Whole Man" became the slogan when the first speaker, George Hambrecht, the new secretary of the State Board of Vocational Education, spoke. Mr. Hambrecht was for some years a member of the Wisconsin Industrial Commission in which capacity he had an oportunity of making observations in the industrial field not open to the average educator. He traced the relations between the school and factory and pictured the mission of the modern vocational school in training for self-assertive and self-sustaining citizenship.

That the vocational school is everyman's, was the burden of an address by John Callahan, the newly elected state superintendent of instruction of Wisconsin. He pointed out the difficulties in enforcing new school laws. The new law which raises the age limit from sixteen to eighteen must be understood by pupils and parents in order to render it wholly acceptable.

"Leadership in the continuation school is not going to be a job for a transformed manual training teacher" said E. A. Fitzpatrick, Secretary of the State Board of Education. "It is a job for a person sensitive to the new attitude in industrial relations, and implies a sense of duty alike to the pupil and the community."

Mrs. Glenn Turner made a plea for inspired teachers in citizenship and the humanities, while Lieutenant Governor Cummings looked to the schools to solve social problems. Among the speakers were also Tracy Cobb, A. R. Graham, Messrs. Faulkes, Gunn, Miss Johnson, supervisor of domestic science, E. W. Barnhart of the Federal Board of Vocational Education, L. P. Whitcomb, H. G. Stewart, L. A. Crocker, E. F. Randall, T. S. Reese, W. F. Rasche, R. L. Cooley, Regina Groves, Walter Simon and Joseph Brown.

A LIST OF LUMBER DEALERS WHO ARE WILLING TO SUPPLY MATERIALS TO MANUAL ARTS AND ENGINEERING SHOPS.

Compiled by Victor J. Smith, Professor of Manual Arts, State Normal School, Alpine, Tex.

Many instructors in our schools and colleges have experienced difficulty in securing the variety of hardwood lumber necessary to properly conduct classes in woodworking. Local yards are rarely able to solve the problem either in variety of woods or price. The following list of firms has, therefore, been compiled in order to enable such schools to get in touch with the larger lumber dealers in their neighborhood.

Each firm is listed by special permission and the general tone of the letters received in answer to our inquiry was one of friendliness to the school shop and a more than commercial interest in manual arts and engineering woodworking.

While local shipments have often delivered lumber cheaper than the prices at the smaller yards these shipments are, of course, to be avoided if possible on account of the high freight rates and possible damage or loss of material. However, several Texas schools have, in the past, secured local shipments from as far as Cincinnati and received the material safely. Had a list similar to this one been in the hands of these instructors a large part of the freight charges might have been saved. Where it is possible several schools in the same neighborhood should club together for a car load of from 6,000 to 12,000 board feet and thus economize on both freight and lumber prices.

All correspondence and inquiries as to dimensions, prices, seasoning, shipping points, etc., should be addressed directly to the firm from whom you contemplate a purchase.

The following list of varieties will enable one to identify the stock for sale by any given firm listed. The second part of the list of varieties is only sold by a few companies.

1. Ash.
2. Birch.
3. Basswood.
4. Beech.
5. Cedar.
6. Chestnut.
7. Cherry.
8. Cottonwood.
9. Elm.
10. Cypress.
11. Plain red gum.
12. Quar. red gum.
13. Plain sap gum.
14. Quar. sap gum.
15. Hickory.
16. Locust.
17. Mahogany.
18. Maple.
19. Magnolia.
20. Plain red oak.
21. Quar. red oak.
22. Plain white oak.
23. Quar. white oak.
24. Persimmon.
25. Pecan.
26. Poplar.
27. Pine (white).
28. Redwood.
29. Sycamore.
30. Tupelo (black gum).
31. Walnut.
32. Willow.
33. Bay.
34. Box elder.
35. Buckeye.
36. Butternut.
37. Hackberry.
38. Hemlock.
39. Laurel.
40. Norway pine.
41. Sassafras.
42. Spruce.
43. Tamarack.
44. Tropical woods.

Alabama.

Demopolis—Chickasaw Lumber Co.—1, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 19, 20, 21, 23, 26, 29, 30.

Mount Vernon—Mobile River Saw Mill Co.—1, 4, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 22, 23, 26, 29, bay and yellow pine.

Arkansas.

Augusta—White River Land & Timber Co.—1, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 25, 29, 30, 31, 32, sassafras and hackberry.

Calion—See Thomas & Proetz, St. Louis, Mo.

Crooked Bayou—See Geo. C. Brown & Co., Memphis, Tenn.

Helena—See Stimson Veneer & Lumber Co., Memphis, Tenn.

Jonesboro—See National Lumber Products Co., Chicago, Ill.

Jonquil—See J. H. Bonner & Sons, Memphis, Tenn.

Jerome—Jerome Hardwood Lumber Co.—1, 9, 11, 12, 13, 14, 20, 21, 22, 23, 29.

Little Rock—See Brown & Hackney, Memphis, Tenn. Surface and resaw.

Pekin—See Geo. C. Brown & Co., Memphis, Tenn.

Proctor—See Geo. C. Brown & Co., Memphis, Tenn.

Texarkana—Dorsey Land & Lumber Co.—1, 9, 10, 11, 12, 13, 14, 20, 22, 23.

Arkansas Soft Pine may be secured from any of the following firms. For small quantities near your locality write to Arkansas Soft Pine Bureau at Little Rock for information. The firms marked A. H. M. A. are members of the American Hardwood Manufacturers' Association. Probably more of these firms can supply hardwoods as well as soft pine.

Bearden—Cotton Belt Lumber Co.

Crossett—Crossett Lumber Co. (A. H. M. A.)

Eagle Mills—Eagle Mills Lumber Co.

Fordyce—Fordyce Lumber Co. (A. H. M. A.)

Malvern—Arkansas Land & Lumber Co.

Malvern—Wisconsin & Arkansas Lumber Co. (A. H. M. A.)

Millville—Freeman-Smith Lumber Co.

Thornton—Stout Lumber Co.

Warren—Arkansas Lumber Co.

Warren—Southern Lumber Co.

Warren—Edgar Lumber Co.

Georgia.

Atlanta—Cleveland-Oconee Lumber Co.—1, 4, 9, 11, 12, 13, 14, 15, 20, 21, 22, 23, 26, 29, 30 & pine. Oconee & Chalker, Ga.

Macon—Case-Fowler Lumber Co.—1, 4, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 26, 29, 31 & pine. Sales office in Philadelphia.

Macon—Massie & Felton Lumber Co.—1, 4, 8, 10, 11, 12, 15, 18, 19, 20, 21, 22, 23, 26, 30, 31 & pine. Sales office in Philadelphia.

Illinois.

Chicago—C. H. Worchester, 19 S. La Salle St.—1, 2, 3, 9, 18. Chassel and Ontonagon, Mich. Carload lots.

Chicago—National Lumber Products Co., Security Bldg.—1, 3, 4, 5, 6, 7, 9, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 31. Carload lots only. Caney Springs, Tenn.; Jonesboro, Ark.; Arcadia, Mo.; Mt. Comb, Miss.

Chicago—Pacific Lumber Co., 11 S. La Salle St.—Redwood only. Local shipments from Chicago and Kansas City. Carloads from Scotia, Calif.

Chicago—Utley-Holloway Co.—1, 8, 9, 11, 12, 13, 14, 20, 21, 22, 23, 25. Carload lots only. Clayton, Mo.

Chicago—Wisconsin Lumber Co., Harvester Bldg.—1, 8, 9, 10, 11, 13, 18, 20, 22, 23, 29. Surface and resaw. Deering, Mo.

Metropolis—E. C. Artman Lumber Co.—1, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 25, 26, 29, 31 and plain and quartered black gum. Surface and resaw.

Mound City—Hendrix Mill & Lumber Co.—1, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 25, 26, 29, 30, 32, box elder, hackberry and quar. sycamore. Carload lots only.

Pekin—Langton Lumber Co. Walnut. (S)

Rockford—Litton Veneer Co.—1, 3, 9, 17, 20, 22, 23, 31. (S)

Indiana.

Evansville—Maley & Wertz Lumber Co.—1, 3, 4, 7, 9, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 26, 29, 30, 31. Memphis, Tenn.; Kilmo, Miss.; Grammer, Ind.

Fort Wayne—Hoffman Bros. Co.—1, 3, 4, 7, 9, 15, 18, 20, 21, 22, 23, 26, 29, 31. (S) Kendalville, Ind.

Huntington—See Stimson Veneer & Lumber Co., Memphis, Tenn.

Indianapolis—Hoosier Veneer Co.—1, 3, 4, 5, 7, 9, 15, 17, 18, 20, 21, 22, 23, 26, 29, 31. (S)

Indianapolis—Long-Knight Lumber Co.—1, 2, 3, 5, 7, 9, 10, 11, 15, 18, 22, 26, 27, 29, 31.

North Vernon—North Vernon Lumber Mills—1, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32. Louisville, Ky.; Dyersburg, Tenn.

South Bend—Hyde Lumber Co.—1, 9, 11, 12, 13, 14, 20, 21, 22, 23, 29, 30. Lake Providence, La.

Iowa.

Davenport—Gorden-Van Tine Co. Pl. Red. Oak. Cypress at St. Louis.

Des Moines—Des Moines Sawmill Co.—Elm and Walnut.

Kansas.

Kansas City—Frank Purcell Walnut Lumber Co. Walnut.

Kansas City—Frank Paxton Lumber Co.—1, 3, 4, 5, 7, 8, 9, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, holly, spanish cedar and curly redwood.

Kentucky.

Ashland—Ashland Hardwood Lumber Co.—1, 3, 4, 5, 6, 7, 8, 15, 16, 18, 20, 21, 22, 23, 26, 27, 29, 30, 31, 32. Farmers, Ky.

Louisville—Holly Ridge Lumber Co.—1, 9, 11, 12, 13, 14, 20, 21, 22, 23, 25. Four Mills in La.

Louisville—Louisville Point Lumber Co.—1, 3, 4, 6, 9, 15, 18, 20, 21, 22, 23, 26, 29, 31. High Bridge, Ky.

Louisville—The Mengel Co.—Mahogany and tropical woods. (S)

Louisville—See North Vernon Lumber Mills, North Vernon, Ind.

Louisiana.

Baton Rouge—See E. Sondheimer Co., Memphis, Tenn.

Clayton—See Utley-Holloway Co., Chicago, Ill.

Donner—Dibert, Stark & Brown Cypress Co.—Cypress and Black Walnut. This firm has shown their interest in manual training to the extent of building and equipping a shop for their local schools.

Junks—See Alexander Bros., Belzoni, Miss.

Lake Providence—Hyde Lumber Co., South Bend, Ind.

Lake Charles—Powell Lumber Co.—13, 15, 20, 22 and pine. Reeves, La.

Rochelle—Tremont Lumber Co.—1, 4, 9, 10, 11, 12, 13, 14, 15, 19, 20, 22, 23, 28 and quar. black gum and golden bay.

Shreveport—Nelson Bros. Lumber Co.—1, 3, 4, 7, 9, 11, 13, 15, 20, 22, 25, 26, 30, and pine. Bungalo, La., and other La. and Texas points.

Shreveport—Peavy-Byrnes Lumber Co.—1, 4, 10, 11, 15, 20, 21, 22, 23, 25, 26, 30 and pine. Emad, La.; Peason, La.; Deweyville, Texas.

Tallulah—See E. Sondheimer Co., Memphis, Tenn.

Tendal—See G. W. Jones Lumber Co., Appleton, Wis.

Urania—Urania Lumber Co.—4, 10, 13, 22 and pine.

Michigan.

Boyne City—Boyne City Lumber Co.—basswood, beech and maple.

Chassel—See C. H. Worchester, Chicago, Ill.

Gladstone—Northwestern Cooperage & Lumber Co.—1, 3, 18, 27.

Newaygo—Henry Rowe Mfg. Co.—3, 4, 9, 22 and made to order parts. Turnings, knobs, etc. (S)

Ontonagon—See C. H. Worchester, Chicago.

Sagole—See Sawyer Goodman Co., Marinette, Wis.

Mississippi.

Bayland—See Bayou Land & Lumber Co., Cincinnati.

Belzoni—See Thomas & Proetz, St. Louis, Mo.

Belzoni—Alexander Bros.—1, 9, 10, 11, 12, 13, 14, 20, 21, 22, 23, 30. Junks, La.

Catchinas—See Thomas & Proetz, St. Louis, Mo.

Charleston—Lamb-Fish Hardwood Co.—1, 9, 10, 11, 12, 13, 14, 15, 18, 20, 21, 22, 23, 24, 25, 29, 30. This firm shows more than usual interest in school and college trade.

Greenwood—Kraetzer Cured Lumber Co.—1, 4, 9, 10, 11, 12, 13, 14, 15, 20, 21, 22, 23, 25, 26, 29, 30. LeFore and Moorehead, Miss.

Kilmo—See Maley & Wertz Lumber Co., Evansville, Ind.

Leland—Darnell-Love Lumber Co.—1, 9, 10, 11, 12, 13, 14, 20, 23.

Louise—See Barr-Holaday Lumber Co., Greenfield, Ohio.

Meridian—C. L. Gray Lumber Co.—1, 9, 11, 12, 13, 14, 15, 19, 20, 22, 26, 29 and pine. Carload lots only.

Mt. Comb—See National Lumber Products Co., Chicago, Ill.

Percy—See Frank A. Conklin Co., Memphis, Tenn.

Sardis—Carrier Lumber Co.—11, 12, 13, 14, 20, 21, 22, 23.

Missouri.

Arcadia—See National Lumber Products Co., Chicago, Ill.

Deering—See Wisconsin Lumber Co., Chicago, Ill.

Kansas City—Chapman & Dewey Lumber Co., Rialto Bldg.—1, 9, 11, 12, 13, 14, 18, 20, 21, 22, 23, 29.

Kansas City—Connelly Hardwood Lumber Co., 18th & Ind. Ave.—1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 18, 20, 21, 22, 23, 25, 26, 27, 28, 30, 31.

Kansas City—Kansas City Hardwood Lumber Co., 1700 Brooklyn Ave.—1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32 and hackberry.

Kansas City—Turner Dennis & Lowry. Spruce, white and yellow pine. Carloads only.

Kansas City—For redwood see Pacific Lumber Co., Chicago, Ill.

St. Louis—Chas. F. Luehrmann Hardwood Lumber Co., 148 Carroll St.—1, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 18, 20, 21, 22, 23, 26, 27, 29, 30, 32.

St. Louis—Cornelius Lumber Co., Arcade Bldg.—1, 4, 5, 6, 9, 10, 11, 12, 13, 14, 15, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30 and 32.

St. Louis—J. P. Lawrence Lumber Co., Syndicate Trust Bldg.—1, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 29 and 30. Southern mills.

St. Louis—Thomas & Proetz, 3400 N. Hall St.—1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 18, 19, 20, 21, 22, 23, 26, 29, 30 and 32. Belzoni, Miss.; Catchinas, Miss.; Calion, Ark.

St. Louis—See Gorden-Van Tine Co., Davenport, Ia.

Ohio.

Cincinnati—Bayou Land & Lumber Co., Neave Bldg.—9, 11, 12, 13, 14, 20, 21, 22, 23, 29, 30. Bayland, Miss.

Cincinnati—J. W. Darling Lumber Co., 4th & Plum St.—9, 10, 11, 12, 13, 14, 18, 20, 21, 22, 23, 25, 28, 29, 30 and 32. Mills in La., Miss., Colo. and Fla.

Cincinnati—Mobray & Robinson Co. Box 854—1, 3, 4, 6, 15, 18, 20, 21, 22, 23, 26, 31. Mills in Ky., Ark., Ohio and Ind.

Cincinnati—Ohio Veneer Co.—1, 3, 5, 7, 11, 12, 13, 17, 18, 20, 21, 22, 23, 26, 27, 29 and 31. (S)

Columbus—American Column & Lumber Co., Brunson Bldg.—1, 2, 3, 4, 6, 7, 15, 17, 20, 22, 23, 26, 29, 30, 31. Butternut, buckeye and hemlock.

Greenfield—Barr-Holaday Lumber Co.—9, 11, 12, 13, 14, 15, 20, 21, 22, 23, 25. Louise, Miss.

Ironton—Fisher-Elmer Co.—1, 2, 3, 4, 6, 9, 15, 18, 20, 21, 22, 23, 26, 29, black and white walnut and pine. Surface, resaw, rip and sand.

Tennessee.

Caney Springs—See National Lumber Products Co., Chicago, Ill.

Dyersburg—See North Vernon Lumber Mills, North Vernon, Ind.

Jackson—Benda Young Lumber Co.—Poplar and quar. white oak.

Memphis—Brown & Hackney, Commerce Bldg.—1, 9, 10, 11, 12, 13, 14, 20, 22, 23, 29. Little Rock, Ark. Resaw and surface at Little Rock.

Memphis—E. Sondheimer Co.—1, 9, 10, 11, 12, 13, 14, 20, 21, 22, 23, 25, 30 and 31. Sondheimer, Baton Rouge and Tallulah, La.

Memphis—Frank A. Conklin Co.—1, 9, 10, 11, 12, 13, 14, 18, 20, 22, 23. Percy, Miss.

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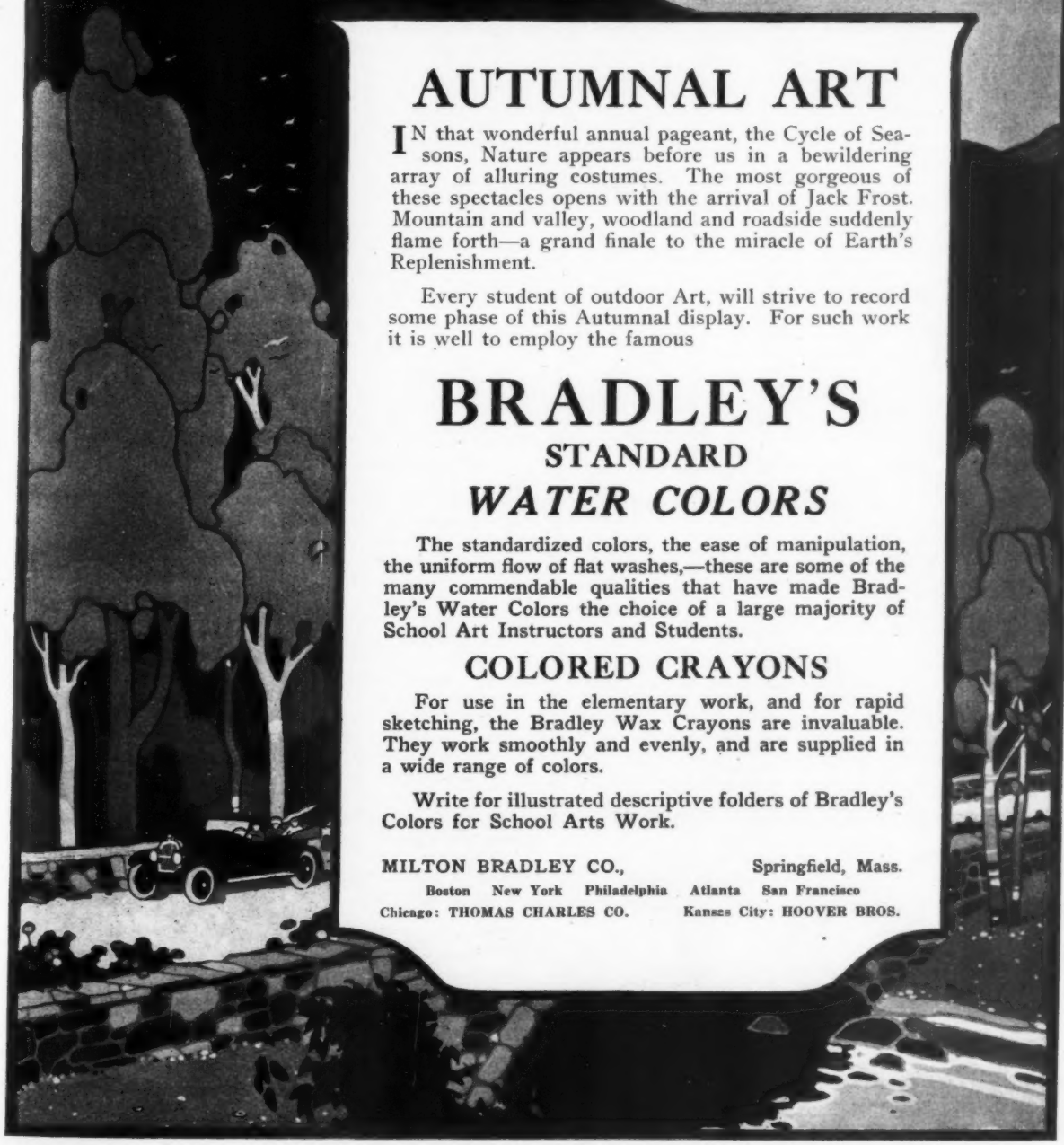

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IAM-10-21

NEWS AND NOTES.

Abandon Continuation School. The high school board at Ottawa, Ill., has abandoned the proposed continuation school plan until such time as the finances will permit the operation of such an institution. The action was taken after the governor had signed a bill providing that the establishment of the continuation schools shall be optional.

The LaSalle high school board has taken similar action in the face of the new legislation. In this case the school had been in operation for a year.

Law Adds Many Pupils to Trade School. A new state law in Wisconsin requires all children between the ages of 16 and 18, not attending a regular school, to attend a vocational school eight hours or one full day each week. Children coming under the vocational school jurisdiction, who are 16 years or under, must attend school one-half day for the regular terms.

Another law requires that children must have completed the eighth grade or they must have had nine years of schooling exclusive of the kindergarten, in order to obtain a working permit.

Favor Vocational Training. The Master House Painters' and Decorators' Association of Ohio, at its recent meeting in Cedar Point, went on record favoring vocational training in all trades in the schools of Ohio.

Enlarge Technical Institute. The contract has been awarded for the construction of four new buildings at the Alabama Polytechnic Institute at Auburn. The work which is to be completed by January, 1922, is to cost $75,000.

Rehabilitation in Industry. The Illinois legislature has passed a bill accepting the provisions of the federal law for the vocational rehabilitation of persons injured in industry. The bill carries an appropriation of $125,000 for the biennium and is to be matched by a similar appropriation by the federal government.

Scholarships Awarded. Twenty-five scholarships valued at $1,000 each, have recently been awarded by the state of New York after examination, to men with five years' experience in trade and technical occupations, and who have spent one full year at the Buffalo Normal preparing to teach their trade or technical occupation.

The men were selected from the following trade and technical occupations: Machine shop practice, printing, electrical work, automobile repairing, painting and decorating, mechanical draughting, architectural draughting, bricklaying, carpentry and sheet metal work.

St. Louis, Mo. The Bell Telephone Company has offered the board of education the loan of six wall sets complete with coil boxes and six desk sets complete with coil boxes, to be used by the class in applied electricity in the Henry Continuation Center.

Approval of Vocational Courses. The Superintendent of the Chicago schools has requested the approval of the State Board of Vocational Education for vocational classes conducted in the day and evening schools in compliance with the regulations of the board for vocational education in the designated subjects.

Cooperation Between Mathematics and Industry. Special mathematical studies directly bearing on the problems of modern industry and commerce should be brought into the course of study in secondary schools, according to statements of W. S. Slauch and W. E. Brenckenridge before a conference of teachers of mathematics, at Columbia University. The aim would be to find out the big ideas, to do away with the old, theoretical work, and to make practical tests the primary consideration.

Federal Aid in California. State and federal aid for vocational education recently apportioned by the California State Education Department to the several counties of the state amounts to $225,806.98. The largest sum, $32,245 has been received by Alameda County, which includes the cities of Oakland, Berkeley, Alameda, etc. Los Angeles County is second with $29,293.

Cooperative High School. A new central cooperative high school, just completed by the New York City board

(Concluded on Page XXIV)

"There was a Magic Instrument—

very precious, made out of costly red wood and gold, with a tube which contained a drop—no, it wasn't a drop, it was a nothing which lived in the water, but the nothing looked like a drop ,and it ran in a frightened way up and down the tube, no matter how cautiously you tilted the magic instrument."

—Sinclair Lewis in "Main Street"

The greatest value in a plumb-and-level is that the "nothing that looks like a drop" shall register accurately.

Every feature of a Disston Level is made as Disston makes everything—with all care possible and the knowledge of generations. The wood is thoroughly seasoned to prevent warping. The level glass is held rigidly in an adjustable casting, and the adjustment itself is the simplest in the world.

The Disston Plumb-and-Level is a good-looking, honest tool, rugged and substantial, and finished beautifully. It brings the same pride to the owner that "the saw most carpenters use" gives to the man who owns one.

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Drag Saw Blades
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Grooving Saws
Gauges—Carpenters' Marking, etc.
Hack Saw Blades
Hack Saw Frames
Hand, Panel, and Rip Saws
Hedge Shears

Ice Saws
Inserted Tooth Circular Saws
Keyhole Saws
Kitchen Saws
Knives—Cane, Corn, Hedge
Knives—Circular for Cork, Cloth, Leather, Paper, etc.
Knives—Machine
Levels—Carpenters' and Masons'

Machetes
Mandrels
Milling Saws for Metal
Mitre-box Saws
Mitre Rods
One-man Cross-cut Saws
Plumbs and Levels
Plumbers' Saws
Pruning Saws
Re-saws
Saw Clamps and Filing Guides

Saw Gummers
Saw-sets
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Screw Drivers
Screw-slotting Saws
Segment Saws
Shingle Saws
Slate Saws—Circular
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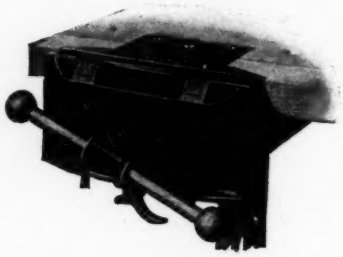

MANUAL training schools whose woodworking departments are equipped with Columbian Quick Acting Universal Vises have the finest vise equipment it is possible to get. If simpler and less expensive vises are desired, there are a number of other types of Columbian woodworking vises, all of which are in general use in manual training institutions. Before you buy a vise of any type, get the complete Columbia catalog.

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CLEVELAND

of education will, it is believed, solve a few of the problems which have confronted the department store in part-time work.

Under the new arrangement, all cooperative high school pupils will be concentrated in Public School 44, where they will receive centralized instruction. In the past these workers have been compelled to compete with pupils giving their entire time to academic study, while they themselves gave only alternate weeks to the school, spending the remainder of the time in store or shop.

The new arrangement will expand the present three-year course to four or five years. During this period, each store drawing its junior help from these classes will intensively train them for work, at the same time enjoying the benefits of their alternate weekly service. It will bring a better educated class of employes and will permit of proper training under store supervision.

The principal of the cooperative school is Mr. R. Wesley Burnham, who for the past few years has been chief coordinator in charge of cooperative courses.

Sale of Hand-Made Articles. The Vocational Society for Shut-Ins, of Chicago, on August 19th held a summer sale of articles made by disabled persons who cannot leave home. Handsome Italian linens, lamp shades in parchment and silk, fancy bags, wooden toys, underwear and knit wear were displayed at moderate prices.

Urge Vocational Training. A plea for vocational training at Woonsocket, R. I., has recently been made by Benj. F. Leland, director of vocational education for the federal government. In urging the inauguration of the training, Mr. Leland points to the expansion of the mercantile and manufacturing interests and the need for fitting young people for service in trade and industrial lines. Among the trades suggested are building, metal and textile as these are especially tied up with the industries of the city.

Illinois Promotes Vocational Training. The state of Illinois has received $231,354.18 from the federal government during the past two years for vocational education in the schools. In addition to the act of 1919, a section has been introduced into the omnious bill carrying an appropriation from the state of $400,439.97, which added to the federal allotment, places under the control of the state board, a total of $800,879.94.

State Board Reorganized. Under a new law, the state board of vocational education of Nebraska has been reorganized, to consist of Dean Burnett of the State College of Agriculture, State Supt. Matzen and County Supt. Margaret McCutcheon. Mr. J. H. Pearson has been named state supervisor of agricultural education and Miss Ida F. Carr assistant state supervisor of home economics.

Vocational Expenses in Iowa. The state board of vocational education of Iowa has expended a total of $22,749 during the biennium beginning July, 1918, and ending June, 1920. The salaries amounted to $17,088, the traveling expenses to $2,254, and the miscellaneous expenses to $1,178.

Establish Industrial Rehabilitation Bureau. The North Carolina Board of Vocational Education has secured the cooperation of the Greensboro Employment Bureau in the establishment of rehabilitation service for disabled persons.

Opposes Elimination of Federal Board. The Chamber of Commerce of the United State has recently issued letters to its members deprecating the elimination of the Federal Board of Vocational Education under the Sweet Bill. It is pointed out that a special subcommittee of experts is needed to adequately take care of the industrial vocation work covered in the expenditure of $3,500,000.

New Members Added to Board. The membership of the Georgia Board of Vocational Education has been increased by the addition of Mr. G. G. Jordan of Columbus, Mr. W. C. Vereen of Moultrie, and Mr. D. M. Hughes of Danville. The terms of two other members, Ross Copeland and A. B. Lovett, have not expired and they will continue on the board.

AT LAST—
a good lettering copy book for your students—

Think of the satisfaction of at last having an adequate method of practice in lettering.

The old problem of securing sufficient and proper practice in lettering in the minimum time allowed has been very carefully studied in the classes of Professors French and Turnbull.

Many systems of ruled sheets and pads and model copy strips were tried — but none gave real satisfaction.

These two experienced teachers determined to work out a method that would provide the student with materials that would give him more time for practice — and the right kind of practice.

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LESSONS IN LETTERING

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You know the FRENCH DRAWING SERIES—

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1.—Getting a course arranged progressively—all or part of which may be used.
2.—Getting the copy in the right place and of the right size.
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4.—Getting a textbook which the student will keep.
5.—Saving all the trouble of preparing instruction sheet.
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The books introduce "Vertical Repeat Practice" and "Horizontal Repeat Practice."

They exercise the student in pencil and in pen work — in single letters and in composition.

Book One gives him a working drawing, a graph, and a map which he must letter, and illustrates how this is properly done.

It gives him on the last page complete model alphabets in light face, bold face, extended and compressed Vertical Lettering for reference.

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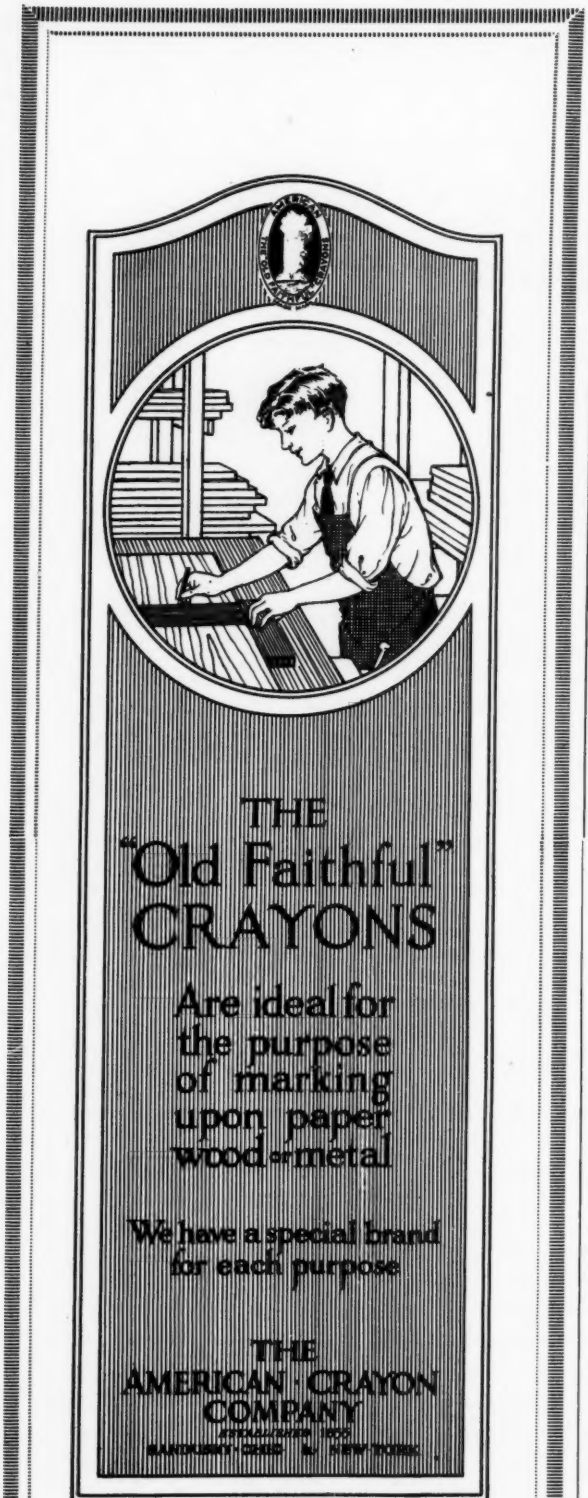
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We have a special brand for each purpose
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(Continued from Page XXIV)

Equip Vocational Shop. The school board of Marion, O., has appropriated $4,000 for the equipment of a vocational shop. The plan of organization contemplates two divisions, one for instruction in the shop and one for mechanical drawing and allied work. The manual training room is to be turned into a pattern making shop.

Enlarge Vocational School. The government vocational school for service veterans at Nauvoo, Ill., is to be enlarged to accommodate one hundred or more students, in addition to 150 at present enrolled. The school is in the nature of a convalescing center and takes care of men discharged from hospitals until they are able to carry full-time work. A staff of fourteen teachers is employed under the direction of Mr. R. H. Harpster, head of the school.

Exhibition of Needlework. The State Training School for girls, at Geneva, Ill., during the recent Pageant of Progress at Chicago, held an exhibit of work carried out by the girls of the school. Examples of the various kinds of needlework, art work, crocheting, embroidering, rug weaving and basketry were shown.

Open Continuation School. Under the provisions of a new state law, a continuation school will be in operation at Canton, Ill., beginning with September 6th. Classes will be held from 2:35 to 4:15 each day.

Training for Industrial Cripples. The state legislature of South Dakota has appropriated $5,000 a year, which is doubled by a federal allowance, for rehabilitation of industrial cripples. The work is in charge of Miss Marguerite Lison.

First Trade Survey. The first trade survey in Wisconsin was recently conducted by eighteen mechanics employed in the state vocational schools. The trades analyzed included machinist, cabinet worker, carpenter, pattern maker, printer, automobile mechanic, sheet metal worker, electrical repairer, and upholsterer.

The analysis is to be applied to teaching trades in the vocational schools of the state. It is planned to send out standardized information for lessons which will tie up with actual production work in commercial shops.

Mechanic Arts Building. A temporary wooden building has recently been erected for the high school at Laconia, N. H., pending the construction of a new high school building. The building will open in September with an equipment of machinery and tools for shopwork.

State Vocational Directors Meet. Fifty vocational school directors from all parts of Wisconsin met at Menomonie, during August, for a vocational conference. The conference discussed plans for the rehabilitation of industrial cripples as provided under a new law placing $22,400 at the disposal of the board. Fully five hundred men in the state will come under the provisions of the law.

Vocational Training at Cantonments. Four government vocational universities, situated advantageously in the east, middle west, south and on the Pacific Coast, will be operated in the near future for the benefit of former service men who are vocationally handicapped. The organization of the vocational centers which is under the direction of Charles R. Forbes, director of the new veteran relief bureau, will include provision for courses in agriculture, elementary and academic science and trades embracing printing, building, plumbing, engraving, electricity, carpentry and steamfitting. The proposed training is intended to make the service veteran a real useful citizen, and to enable him to command a living wage when he enters the industrial field.

New Trade School. The contract has been awarded for the erection of a trade school at Ansonia, Conn., at a cost of $90,000. The building will be erected through a gift of $250,000 given by Col. C. H. Pine and the present structure will be eventually enlarged by two wings which will use up the remainder of the fund. The sum of $20,000 has been guaranteed for equipment.

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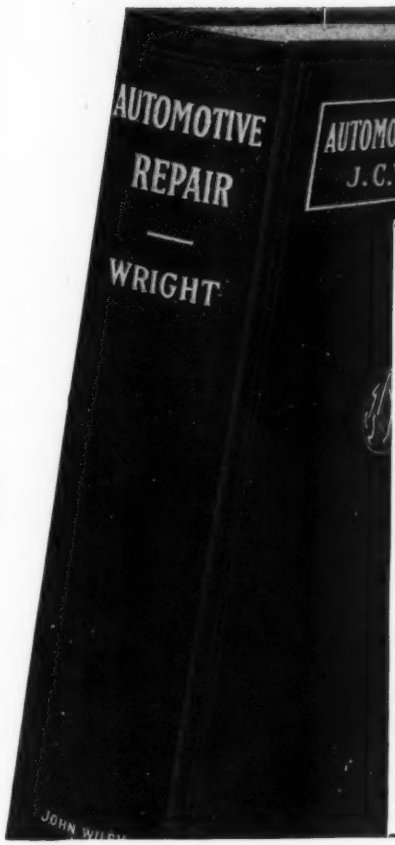

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A NEW INSTRUCTION MANUAL OF REPAIR JOBS FOR THE GENERAL REPAIRMAN AND THE OWNER

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In this new book, Mr. Wright has presented the general automotive repairman's work in a sensible and logical way. He includes the actual practice covering every job common to general garage work and then gives the "whys" in Part II. Thus it makes an ideal combination of practice and theory.

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IAM-10-21

(Continued from Page xxvi)

The News Bulletin is the title of a pamphlet issued four times a year by the Pennsylvania Society for Vocational Education, at Harrisburg. The paper as its name indicates, is intended for the spread of vocational education in the state. It prints articles on agriculture, industrial education, teacher-training and allied subjects and includes news items of interest to readers in the state.

Offer Printers' Course. The College of the City of New York is offering a series of special courses for the benefit of printers and office workers in allied occupations. The first course in cost finding and estimating, and advertising typography, is intended to acquaint the students with the methods and customs of a modern printing office. The course opens October 7th and carries a fee of $7.50. The second course in practical proofreading, preparation of copy and printers' technical English is for students who desire a thorough training in the technical elements of the language. The studies embrace the various technical elements of the language and their practical application in everyday literature. The course opens on February 14th and carries a fee of $10.

New Teachers and Courses at Design School. The new school year of the Rhode Island School of Design at Providence, R. I., opened with a number of courses intended to meet growing conditions. Two departments embracing mechanical design and textile design have been added, with Mr. Donald H. Boothby in charge of shopwork and mechanical drawing, and Mr. Thomas A. Armstrong in charge of cotton and woolen yarn manufacture. New machinery in the shape of a wool picker, a set of wool cards, a mule and a Jacquard lacing machine have been added to the department of textile design.

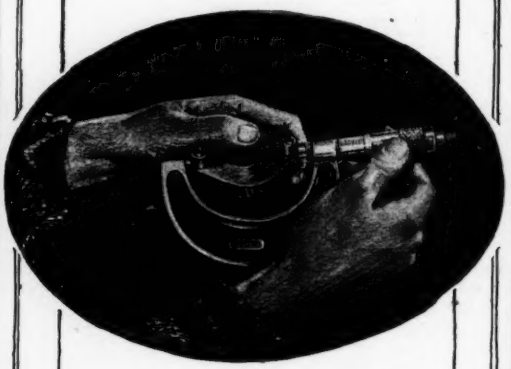
Variety of Work Offered at LaGrande, Ore. The Manual Training Department of the LaGrande School System is in charge of two teachers. The head of the department, Mr. E. A. McEachran, is in charge of all the machine shop work, forging and automobile mechanics, in addition to some work in architectural drafting. The students have turned out some very valuable pieces of work during the past year. In conducting the work in automobile mechanics, the machines are provided by residents of the city and the work is done by the students of the department under the supervision of the instructor.

Mr. C. C. Snow who is in charge of all wood working projects, has 67 high school students and 118 seventh and eighth grade boys under his direction. The work is adapted to suit the needs of the students and considerable project work has been undertaken for the schools such as cabinets, cloak lockers, screens, furniture repairing, marking and painting, basketball court, stage setting and the building of stage scenery. One student made a newspaper rack, which is considered quite out of the ordinary and one of the best to be obtained. Cedar chests of good quality were constructed during the past year and the results indicated that painstaking work had been done. A display of the work carried out during the year was favorably commended by the leading business men of the city who viewed the exhibits and tested their worth.

Mr. J. W. Hoyer, who for the past three years has been director of mechanic arts at the Northern Normal and Industrial School, Aberdeen, S. D., has recently become supervisor of manual training and director of the Vocational School, at Casper, Wyo.

Evening Vocational Courses. Three evening vocational schools for ex-service men have been opened in Chicago under the auspices of the Knights of Columbus. Mr. W. J. Bogan, principal of the Lane Technical High School, is acting as general superintendent of the work.

Mr. L. S. Greene, recently connected with the University of Wisconsin, has been appointed State Supervisor of Industrial Education for Florida. Mr. Greene makes his headquarters at Gainesville where the University of Florida is located.



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Starrett Tools

Completes Printing Equipment. Under the direction of Mr. James C. Tucker, the Bethlehem, Pa., schools have recently purchased a printing equipment costing $12,000. The shop will be located in the new high school building and will serve for the vocational and prevocational classes. It is proposed to equip in this same building complete shops for cabinet making, pattern work, machine shop practice, electrical work, sheet metal work, forging, heat treatment of metals, and drafting. It is proposed to conduct the classes on the basis of the Smith-Hughes act.

PERSONAL NEWS.

Mrs. George A. Augherton, who has been supervisor of evening practical arts classes at the New Bedford, Mass., vocational school, has resigned.

Mr. Grover C. Robbins, head of the vocational department at McKeesport, Pa., has resigned.

Col. Paul B. Clemens, director of the Superior (Wis.) vocational school, has resigned. He received the title of colonel with the intelligence department of the Thirty-second Division, and was cited a number of times for his achievements in the World War and on the Mexican border. He will take a course in the fall at the University of Wisconsin.

Mr. Charles R. Bostwick, since 1920 manager of the Geometric Tool Company of New Haven, Conn., has recently been appointed principal and manager of the Poppenhusen Institute, at College Point, Long Island, N. Y. The Institute is an old privately endowed school which teaches technical and practical subjects to both sexes.

Mr. Bostwick was formerly supervisor of manual arts at Plainfield ,N. J., going from there to the Kamehameha School for Boys in Honolulu. During most of 1918 and 1919 he was Chief of the technical work and first lieutenant in the Sanitary Corps. In January, 1920, he became personnel manager of the Geometric Tool Company.

The salary of G. B. Edwards, state director of vocational education for Montana, has been raised from $3,000 to $3,600 a year.

Mr. C. V. Williams, director of vocational education of Kansas, has resigned.

Mr. Arthur D. Dean of Columbia University, has been appointed assistant director of the new Veteran's Relief Bureau at Washington, D. C. Mr. Dean held the chair of vocational education since his appointment in 1917. He was state director of vocational education of New York State for eight years and had charge of all state-aided vocational training in public schools.

Mr. Dean is a graduate of the Rindge Technical School of Cambridge and received his degrees from the Massachusetts Institute of Technology and from Alfred University. During the world war he was a major in charge of reconstruction work.

Mr. James S. Dodds has been appointed teacher of mechanical drawing at the Ralston Industrial School, Pittsburgh, Pa.

Mr. Elmer A. McGill has been appointed manual training instructor in the continuation schools of Pittsburgh.

The salary of Miss Lucy Silke, supervisor of art at Chicago, Illl., has been increased to $4,000.

NEW BOOKS.

Solution of Triangles.

By Erik Oberg. Octavo, paper, 100 pages. Price $1. The Industrial Press, Publishers, New York.

This is a very complete book on the geometry and trigonometry of triangles and while it presents only the theory of right angled and oblique angled triangles, it is intensely practical. It has been developed by the author, who is editor of "Machinery", from actual problems met with most frequently in drafting rooms and machine shops.

The book will serve splendidly as an advanced text for apprentice classes and will be found useful in the trade school library. It is a veritable mine of helpful information for the teacher, the draftsman and the mechanical engineer.

(continued on page xxxii)

Continued from Page XXX

Modern Apprenticeships and Shop Training Methods.

By Erik Oberg. Paper, 118 pages. The Industrial Press, New York. The Machinery Publishing Co., London.

The purpose of this book is to describe in detail the apprenticeship system fostered by the machine industries and the shop training methods used in leading machine building plants. The author is editor of "Machinery" and he presents very strongly the management viewpo.nt in the discussion, machine shop problems.

He valuates apprenticeship from the standpoint of producing the all-around mechanic, the producer and in effect, he gives a secondary position to the problem of making a citizen and a man as a result of apprenticeship training. His treatment of the subject deserves attention because it emphasizes factors which the schoolman sometimes loses sight of in his eagerness for education.

The book holds that apprenticeship in the shop is more effective than trade schools or evening classes. The burden of preparing mechanics rests on the industries and the leaders in the field have recognized this fact by introducing very complete apprentice courses. The body of the book describes in detail the plans of such leading firms as Pratt and Whitney, Le Blond, Taft-Pierce, American Locomotive Co., Norton Co., Willys-Overland, Eastman Kodak Co., etc. Special chapters take up the training of welders and of women machine operatives. The chief value of the book is its clear description of outstanding, successful plans, and the suggestiveness of many methods as applied to the organization of evening and day trade school courses.

Elementary Qualitative Analysis of Metals and Acid Radicals.

Frederick C. Reeve. Cloth, Crown octavo. 143 pages. D. Van Nostrand Co., New York, N. Y.

This book is a laboratory manual which has been reduced to the simplest terms and from which the author has stripped all extensive descriptions and references to special tests. The introduction takes up the general processes of analysis and the grouping of metals and describes ionization in its bearing on the subjection. The treatment is concise and direct and takes into account the help which beginners require in a text.

Farm Blacksmithing.

John F. Friese. Cloth, octavo, 92 pages. Price $1.25. The Manual Arts Press, Peoria, Ill.

A series of practical problems in forging simple articles used on the farm make up this book. The series begins with a simple ring, involving the processes of squaring ends, bending, and ends with a hoof parer, necessitating some fairly difficult shaping and fitting. Descriptions of tools and processes are introduced in the natural order as required by the work which is to be undertaken. Some facts on iron and steel and a brief description of methods of hardening and tempering conclude. The book is clearly based upon experience in farm smithing and in teaching the work and is adequate for the school as well as the farm shop.

Industrial Mathematics Practically Applied.

By Paul V. Farnsworth. Cloth, octavo, 272 pages. D. Van Nostrand Co., New York.

This book covers the entire range of practical mathematics as applied to the metal working occupations. It is, as the author indicates in his preface, the result of twelve years of experience in teaching students in trade courses. The book reviews in less than fifty pages, the entire range of arithmetic and then takes up the elements of algebra and plane trigonometry. From this point on, it plunges into the applied mathematics of the shop without further consideration for a logical development of higher mathematical principles. The treatment follows the usual arrangement of topics in mechanics and proceeds from the simplest motions and force to the most complicated cam design. Each topic is introduced by means of definitions and descriptions and the mathematical elements are reduced to formulas with the standard engineering nomenclature. The problems are taken almost entirely from

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STANLEY "EVERLASTING" CHISELS

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The leather washer, placed between the upset head and the handle, acts as a cushion to prevent splitting. The brass ring, driven into the handle, provides an additional safeguard.

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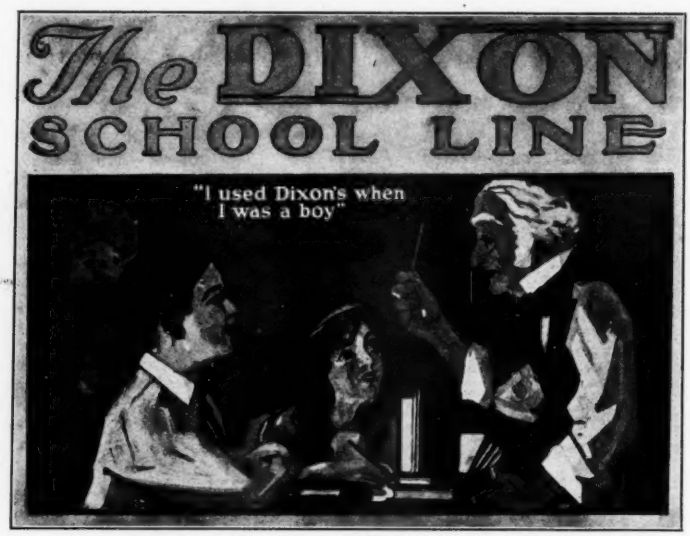

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actual shop experience, with a very few examples of "boy interest."

The book appeals to us as the most thorough and teachable book which has been offered for vocational classes in technical high schools and trade schools. It is especially satisfactory in its approach and in the insistence upon methods which are standard in the drafting room and the shop.

First Course in Analytical Geometry.

By Charles N. Schmall. Cloth, 338 pages. Second edition. Price $1.25. D. Van Nostrand Co., New York, N. Y.

This book has been deservedly popular not only in the United States but also in England because of its clearness and completeness and its avoidance of vague and abstruse proofs. The new edition has been enlarged by introducing into the appendix a number of proofs and propositions which supplement material already in the book and which the experience of sixteen years use of the first edition have seemed to make desirable. The work carries along the study of plane geometry to include such higher plane curves as the lituns and the logarithmic spiral and the solid geometry to surfaces of revolution. The examples are numerous.

Industrial Mathematics Practically Applied.

By Paul V. Farnsworth. Cloth, 273 pages, illustrated. D. Van Nostrand Co., New York.

This book covers the entire field of simple mathematics applied to the machine industry. It is in fact simplified mechanics for the practical shop and draftsman. The standard formulae and data used in American shops are constantly used so that the student can from the beginning work and talk in the language and according to the short methods which he will later find in his daily contact with the problems and the men of the shop. Incidentally the book offers a vast amount of information on machine shop practice. The book is to be heartily recommended for trade and continuation school classes.

Plane Trigonometry.

By Arnold Dresden. Cloth, 110 pages. John Wiley & Sons, New York City.

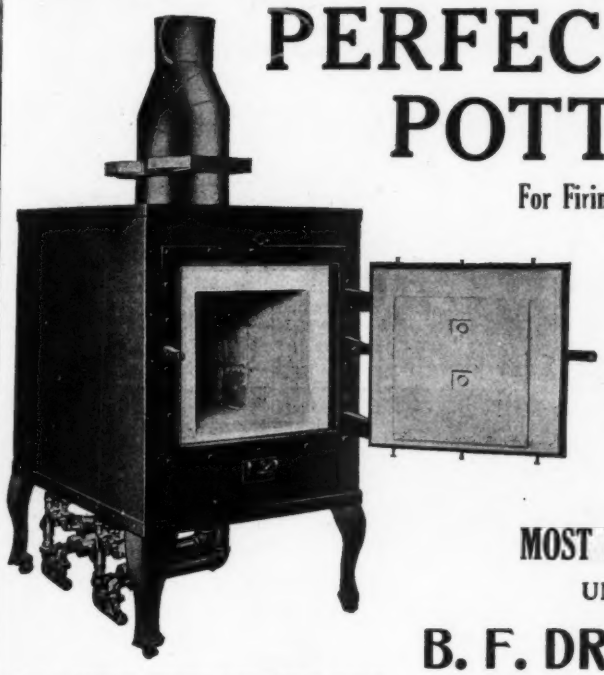
This book covers the ordinary field of plane trigonometry in a very thorough manner. The most valuable feature is the emphasis laid upon the study of the function as the fundamental concept of all trigonometric theory and practice. The reviewer remembers from his own college days that the lack of this in the textbook which he studied, and the assumption on the part of the teacher that it should be easily understood, made the subject of trigonometry distasteful and correspondingly difficult.

The present book makes the theory of functions so clear that it becomes a pleasure to read chapter two. The book also emphasizes curves and their applications, and contains much practical material in the form of applications. The author has purposely omitted examples taken from mechanics and from applied sciences on the theory that the book should stress the fundamental concepts of trigonometry and should suggest rather than supply the practical applications.

Issue Manual Training Bulletin. The Oliver Machinery Company of Grand Rapids, Mich., has just issued a new Manual Training Bulletin, illustrating and describing all of the special types of machines manufactured for schools. The pamphlet includes also a line of fine tools and supplies which is available for school use.

Among the new machines just announced by the firm is the Oliver No. 126 belt sander. This machine is intended for sanding or polishing moldings, straight or flat surfaces and built up pieces such as cedar chests, desks, chairs and medium size pieces of furniture. The machine has a number of new and exclusive pieces that make it of especial interest.

Copies of the Oliver Manual Training Bulletin will be sent to any teacher upon request.



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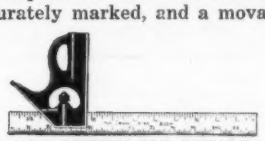
NEW TRADE PRODUCTS.

New Try Square on Market. The Lufkin Rule Company, of Saginaw, Mich., has announced the marketing of a new "Universal" Try and Mitre Square No. 65, designed especially for carpenters' use. The tool is fitted with a steel blade accurately marked, and a movable head which



NEW LUFKIN TRY SQUARE.

can be securely clamped at any point. The square is provided with a depth gauge which is handy for measuring the depths of mortises. The blade can be moved as desired and can be used separately as a rule. The tool is popularly priced and is entirely accurate.

Offer New Cutter. North Bros. Mfg. Company, Philadelphia, Pa., have just placed on the market a new cutter

NEW YANKEE BELT CUTTER.

for belting, brake lining and similar materials. The cutter is of especially heavy construction. Power is secured through rack and pinion movement operated by a lever. The adjustment is such that a clean cut will always be obtained.

Circulars and prices are available to any industrial-arts teacher who will address the firm at Philadelphia.

Offer New Small Engine Lathes. The Monarch Machine Tool Company has just placed on the market two new lathes which are of especial interest to schools. They are the Monarch Junior 9 and the Monarch Junior 11 inch lathes, and are intended for small high grade work. Both are equipped with head stocks of a solid, full-webbed bowl type and have spindles of fifty carbon crucible steel. The gear box is of the quick change type and is very simple in design. The bed is of semi-teel of unusual strength and rigidity. The tail stock is massive and has a base graduated for accurate set-over for taper turning. The 9 inch lathe is equipped with bench legs and the 11 inch lathe has full length legs and a generous chip pan.

The Monarch Machine Tool Company has prepared complete descr.ptive circulars which will be sent to any school authority who addresses the firm at Sidney, O.

Rapid Belt Sander. The Oliver Machinery Company of Grand Rapids, Mich., has just placed on the market its new 126 Belt Sander, which is intended for rapid sanding and polishing of all kinds of line and edge moldings, straight and flat surfaces, and built-up pieces, as well as the polishing of metal.

The Sander has been designed for use in large factories, small wood working shops and manual training schools, as well as factories where a finishing and polishing machine is required.

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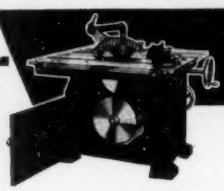

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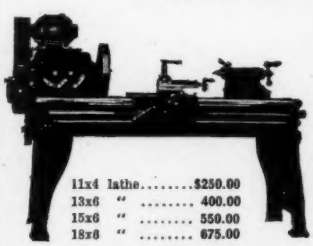

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